Conference Agenda

Monday, May 21
9.00 -9.30 Registration
9.30 – 10.15 Opening Session

Welcoming Remarks

Professor Aram Simonyan - Rector of Yerevan State University
Larisa Minasyan.- Open Society Institute Assistance Foundation Armenia. Executive Director
Lana Karlova - Yerevan "Tempus" director
Arevik Saribekyan – British Council Armenia, director
Professor Samvel Shoukourian - IT Educational and Research Centre, Yerevan State University, Scientific Supervisor

Keynote Address
10.15 – 11.00 William Marsterson, Middlesex University Learning Resources. London
Topic: Learning resources in the 21st century
11.00 – 11.15 Questions

11.45 – 12.30 **Panel Session Access to e-resources Moderator Alan Hopkinson**
Presentations on the situation in different countries:
11.45 – 12.05 S. Sargsyan, A Hovakimyan, S. Barkhudaryan, Yerevan State University, (Armenia) Using Template Processing Technique in the Pervasive e-Learning Supporting Systems
12.05 – 12.25 Mariam Garibyan London School of Economy and Political Science Library "Building a national federated access management infrastructure: the UK experience"

Q&A

Panel Session Access to e-resources
Paper presentations from different countries: **Moderator Tatiana Czepurnyi**
13.30– 13.50 M. Astvatsatryan, G. Terzyan, A. Arnaudyan Yerevan State Linguistic University, "Integration of ICT in Education"
13.50 – 14.10 B.Sukhbaatar, L.Batkhishig, G.Ganchimeg School of Telecommunication and Information Engineering (Mongolia, Ulaanbaatar) Using e-Library for the distance learning
14.10 – 14.30 S. Khachatryan National Institute of Education and Yerevan State University "Education and students informal learning in the information age"
14.30 – 14.50 A. Kuchukyan, S. Karapetyan Yerevan Computer Research & Development Institute (Armenia) The AREV system: problems of design and implementation for persons with impaired vision

Q&A

Paper presentations: Moderator Emilija Banionyte
15.30 -15.45 M. Ibodulloev GIPI Tajikistan "Unified Information Communication Environment for the academic community of the Republic of Tajikistan"
15.45 – 16.00 V. Terziyan, A. Vitko, N. Koreyko. Kharkov National University of Radioelectronics (Ukraine) Ontological scientific-educational portal
16.00 – 16.15 Maryna Narovlyanska Institute of Psychology named after G. Kostyuk, Academy of Pedagogical Science (Ukraine) "Using computers and Internet technologies in the development and correction work of the psychologist".

16.15 – 16.50 Discussions

Tuesday, 22 May
9.00 -9. 45 **Keynote speaker** Anne May, University of Hannover library. Hannover
Topic: e-Learning
09.45-10.00 Questions

10.00 – 11.00 Panel Session: "Open Source products and Open Access Journals Moderator David Sandukhchyan
10.00-10.15 Alex Birchall, Alan Hopkinson, Middlesex University London "Open Source in Higher Education"
10.15 – 10.30 Bess Sadler, University of Virginia Library (USA), T. Zargaryan Yerevan State University, the Library of the Academy of Sciences, (Armenia) "Library-in-a-Box" program: a new eIFL.net open source software initiative for the libraries from developing and transition countries"
10.30 – 10.45 Emilija Banionyte Vilnius pedagogical University Library, (Lithuania) "Open Access to Scholarly Communication"
10.45 – 11.00 Filip Stojanovski Metamorphosis Foundation**,** (Republic of Macedonia) FOSS in Macedonian Educational System

"Training of librarians, educators and users" Moderator Siranush Sargsyan
11.30 - 12.45 Paper presentations
11.30 – 11.40 Satenik Bella Avakian, American University of Armenia, (Yerevan Armenia) "Developing the American University of Armenia Information Literacy Programme: an examination of some issues"
11.40 – 12.00 Yevgeniya Sulema, National Technical University of Ukraine, "Kyiv Polytechnic Institute" (Ukraine) "E-Learning in Computer Science"
12.00 – 12.20 Samvel Karabekyan, Marat Yavrumyan Yerevan State University (Armenia)"'e-perfect' but not 'e-ready': long way to the e-learning"
12.20 – 12.40 Ilmar Nopri Master of Arts in Education (Estonia) "Real Life – Virtual Learning Environments"
12.40 – 13.00 Daler Tadjidinov Public Fund Civil Initiative on the Policy of Internet (Tajikistan) "Open Education Management System based on the Open Admin"

14.00 – 17.00 Paper Presentations
Moderator Satenik Bella Avagyan
14.00 – 14.20 Danguole Rutkauskiene Kaunas University of Technology, (Lithuania) "Training the Educators using ICT in Lithuania"

14.20 – 14.40 Hans Gurbrod Caucasus Research Resource Center (Georgia) "Extension programs and e-learning opportunities for Social Scientists: CRRC experience with the Moodle platform".
14.40 – 15.00 T. Zargaryan, L. Khachatryan Yerevan State University (Armenia) Train the trainers courses in Yerevan State University using 'Moodle' Open Source Software.

Paper presentations Moderator Tigran Zargaryan
15.30 – 15.50 Mkoyan K[1]., Astsatryan H[2]., Sahakyan V[2]. Yerevan Physics Institute[1], Institute for Informatics and Automation Problems NAS RA[2] (Armenia) Grid activities in Armenia related to the Science and Education

15.50 – 16. 20 Janpoladyan B., Grigoryan H., Kalantaryan A., State Engineering University of Armenia (Armenia) Digital library. building, implementation, prospects.
16. 20 –16.30 R. Kvatadze, Georgian Research and Educational Networking Association GRENA (Republic of Georgia) "Black Sea Initiative for Research and Educational Networking"

16.30 – 17.00 Discussions

Wednesday, 23 May
9.00 – 9.45 **Keynote speaker Kyriaki Anagnastopoulou,** Middlesex University London
Q&A
Paper presentations: moderator Tigran Zargaryan
10.00 – 10.20 Arthur Petrosyan, Robert, Tadevosyan Institute for Informatics and Automation Problems (Armenia) Development of Armenian high speed research and education interconnection network
10.20 – 10.40 I.Mkrtumyan American University of Armenia, Internet Society - Armenia Information Security of Education Networks
10.40 – 11.00 Sargsyan S., Hovakimyan A., Barkhudaryan S., Gyurjinyan A., Yerevan State University, (Armenia) "Application of Fuzzy Theory in Adaptive e- Learning Systems"

11.30 – 13. 00 Opening of the computer center at the YSU library, supported by EU JEP 25008-2004
Paper presentations: moderator Serob Khachatryan
14.00 – 17.00 e-Learning and the teaching process
14.00 – 14.20 Ruzan Petrosyan Yerevan State Medical University (Armenia) "The role of the modern technologies in the teaching of pediatrics: current issues, success and difficulties".
14.20 – 14.40 B.Sukhbaatar, G.Ganchimeg, E.Narantuya School of Telecommunication and Information Engineering (Mongolia, Ulaanbaatar) Educational materials based on multimedia 14.40 – 15.00 E. Manukyan, S. Manukyan, G. Nazaryan State Engineering University of Armenia "Mathematical models of intellectual search in texts on natural language."
Life long learning

Paper presentations: Moderator Anna Hovakimyan
15.30 – 15.50 A. Khachatryan, H. Ghazoyan Yerevan State University (Armenia) The application of information technologies in teaching of chemistry
15.50 – 16.10 K Samvelyan, School number 69(Armenia), New technology in secondary school
16.10 – 16.30 Tigran Aynajyan, State Engineering University of Armenia "The Efficient Evaluation methods of Distant learning Systems"
16.30 – 16.50. N.Kchublaryan, A.Hovanisyan, Russian-Armenian (Slavonic) University (Armenia), Means of Knowledge Control in the System of Adaptive Computer Education

16.50 – 17.20 Discussions
Conference closure

Thursday: parallel sessions.
Session 1: Zaria Grinhill Training session on VLE
Session 2: Richard Gartner Training session on METS

Foreword

From the start of the "Building Digital Educational Services and Content Creation Centre in Yerevan State University Library" (EU TEMPUS JEP 25008-2004 project) it was planned at the end of the project to hold an international conference "Information Technologies in Education in the 21st century". The partners in the present JEP are Yerevan State University, Middlesex University (London), University of Hannover and German National Library of Science and Technology (TIB). This publication is the result of that Conference, held in Yerevan, Armenia from May 21-23, 2007. The aim of the conference was to summarize the results of the two-year project, the outcomes and achievements, and to introduce to the Conference participants and the Armenian library and educational communities European quality standards on Library Management and Distance Learning, Equality of Access, Diversity and Intellectual Freedom. Also, to further debates on the topic "Education for the twenty-first century: how it must be", and to share knowledge with participants on this topic. Since one of the most important features of the project was to establish the infrastructure, both physical and administrative, for a Virtual Learning Environment (VLE), this was a very suitable topic for the Conference. So the theme of the VLE recurs in a number of papers; another name for this is LCMS, used more often in North America than in Britain; we mean by this software to facilitate e-learning.

As is mentioned in "UNESCO Task Force on Education for the Twenty-first Century", education throughout life is based upon four pillars: **learning to know, learning to do, learning to live together and learning to be.** These four pillars of the Education are closely connected with the questions:

(i) what type of innovative learning tools do we suggest?
(ii) how do we adapt education so that it can help learners to do the work needed in the future?
(iii) how must education be used to teach students about human diversity, tolerance and to help to discover people? and
(iv) how can education contribute to every person's development in the rapid changing world?

To be able to answer these questions, modern educational system must react to the challenges of the "Knowledge Society". And the topics, covered during the Conference reflect the broad subject areas, such as digital libraries, distance learning, e-content, which are the basic building bricks of the Knowledge Society. From this point of view, the Conference topics are divided into groups:

- The role of e-learning resources in the education process;
- Methods and means for accessing e-resources;
- The usage of Open Source Systems in education and new scholarly communication mechanisms;
- Training of University staff;
- E-learning and virtual learning environments;
- Metadata

University managers, librarians, IT specialists, educators, and computer network experts from different countries presented models and approaches on organizing and managing the learning process being used in their institutions. Most of the presenters had participated in the 2005 Yerevan Conference "Information Technologies in Education", and for most of participants the 2007 meeting was a continuation of discussions, started at 2005. We hope that after 2 years, at 2009, the third international conference will be held, and we will be able to continue the dialogue we started in 2005.

Conference participation fees for the representatives from the EU partner universities and for the project expert were covered from the TEMPUS JEP budget. Participation fees for the representatives of the NIS, Central and Eastern European countries, and Middle East were covered by the grants from the United States Agency for International Development, Open Society Institute 'East East: Partnership Beyond Borders' program. British Council Armenia covered participation fees for one invited paper presenter. As the members of the project team, the grant contractor and grant coordinator, and editors of the Conference proceedings, we express our thanks and gratitude to the Conference sponsors, the authors, and the participants.

Alan Hopkinson
Tigran Zargaryan
Editors:

Yerevan, 2007

Table of Contents

Will be mounted in the typography, when typographical formatting will be done

LEARNING RESOURCES IN THE 21ST CENTURY AND THE ORGANISATION OF UNIVERSITY LIBRARIES

William Marsterson
Pro Vice-Chancellor, Head of Learning Resources and University Librarian
Middlesex University
London, UK

1. Introduction

I feel very honoured to address you about the organization of modern university libraries. I have been asked to talk about Learning Resources in the 21st Century. I will do this in the context of the organization of library functions in a modern university, based on what is happening in the UK. I have also visited university libraries in the United States of America, France, Germany and Spain. The United Kingdom position is markedly different. However, on my visits to other countries, colleagues there seemed very interested in the UK approach to library service, and indeed, in learning from us, and following our example and we too are interested in learning from theirs.

To start with I will discuss briefly what we mean by Learning Resources, and the changes in technology and communication which affect provision of Learning Resources. I'm then going to give an overview of university libraries in the UK, their different types, and the links they have to other libraries and resources. Then I will talk about the position of the university library within an institution, and the internal structure of the library itself, and issues about communication. So far I have used the term "library", but many university libraries, in the UK and elsewhere to some extent, are part of a larger organisation structure or department. In the UK we call these "converged" services, the term referring to services brought together by some means, normally the use of ICT. Then I want to illustrate all this from the experience of my own institution, Middlesex University, and describe the kind of service organisation we have adopted, and the kinds of services we offer. This will raise the more general issue of what librarians are trying to do, what is their essential role.

2. Learning Resources: definitions

The term Learning Resources is very widely used in the UK, and in other English speaking countries, but it can have a variety of meanings depending on the context. For instance, it is common for academic staff describing their programmes (say in the context of a quality assurance or self-evaluation event) to speak of the staff leading and contributing to teaching as their most important "learning resource". And in one way, this is right – how else could the students learn without inspiring teachers? Actually some do learn without teachers, but mostly the staff leading and delivering a programme are the primary resource for students on that programme. In the UK we have a formalised system of quality assurance, and the resources supporting a programme are considered, including staff, space, library and computing services and so on. So teaching space and equipment (the classroom, the computers) are "learning resources". In another way, the design of a taught programme, its curriculum and its modes of assessment are a resource aiding the student to learn. Putting all these programmes into a VLE makes it more obvious that the learning systems enshrined in a programme are a vast collection of learning objects, tasks, opportunities for assessment and feedback. But within this, the role played by using published information and the guidance in its use offered by university librarians are a very significant resource. And the emergence and now prevalence of electronic versions of these publications (books, journals and so on) makes it mush easier to deliver them within a VLE, or direct to students in a physical library. Equally the means used for delivering the programme itself on a VLE can be effectively used by librarians, and others who provide learning support, to guide students in the most effective ways of using published information and gaining and improving their range of study skills.

It would be convenient if Learning Resources were simply "books and journals", or academic programmes, or staff, or space. In practice it is the provision of a coherent mixture of these elements which creates an ideal environment for learning.

3. What's new about the 21st Century?

We've already established that the learning environment may be virtual as well as physical – even instead of physical, for some students. This would have not been possible ten years ago, and not conceivable when I first became a librarian some forty years ago. For people of my age, the rate of technological change, and the effect this has had on communication and culture, has been amazing. We now have generations of children in our primary schools (including my 5 year old grandson) who are adept at using a computer and doing searches on the Internet; who channel hop on TV, who download onto i-Pods, who multi-task with a range of technologies and contents. Quite what the content or its quality is may be questioned, but their skill and speed of assimilation is much faster than that of their teachers. These kids are "Digital Natives", or "Born Digital". The children who went to school as the World Wide Web emerged in the early 90's are now our students, also "Born Digital". By comparison some of our current students, particularly the older ones, have had to learn this range of skills in later life: these are called "Digital Immigrants". But even they are catching up fast: by now in the UK 50% of households have broadband access to the Internet, and a far higher percentage will have at least one, probably several PCs (or Macs) in their homes. All this makes me feel a "Digital Alien", using my son and my grandson to help me catch up in a strange and wonderful (sometimes infuriating) world. But in the learning environment, one significant point to bear in mind, and work through, is that policies are set, programmes are written, delivered and supported, and resources are obtained by those who are still "Digital Immigrants" (however good their accent may have become). Presenting this to students who are "Born Digital" requires both care and persuasiveness. Because the underlying processes of learning, and gaining critical skills, should not have changed, whatever the content and whatever the medium of delivery.

So, while we, as librarians concentrate on library services, we should understand that we do so within a context which requires collaboration and partnership with others in the university. I will describe later the range of staff we a Middlesex call Learning Resources staff, but need to indicate that whether these are joined in one overarching service, or located in other parts of the university, it is considerably more appropriate in this digital age to see the library as part of a larger spectrum of services, providing the learning environment. So let us look at how university libraries are organised in the UK.

4. Organisation of libraries in UK.

We have a professional body known as SCONUL, the Society of College, National and University Libraries. It has no governmental standing, but is a limited company representing the interests of University Libraries in the UK and (interestingly) Ireland – including the Irish Republic. Its members are technically the institutions (universities and colleges), but in practice the Librarian represents the institution, so it is in a way a Librarians' association. It has over 170 libraries in its membership, including National Libraries (3), "Research" libraries (25), traditional and relatively recent University libraries (45), New or Modern University libraries (formerly Polytechnic, but designated University since 1992) (44), and College and other HE libraries (64). This last group contains a few museums of national standing, such as the Science Museum or the Victoria and Albert Museum, which houses the National Art Library. Of all of these, some 9 are from the Republic of Ireland, and are not technically UK libraries, though they share much cultural heritage, and much in the way of organisation and technology.

There are several ways of classifying these 170 HE libraries, apart from the breakdown I just gave. All University libraries support research within their institutions. However not all have large collections of primary research material, nor do all focus on research support through their journal collections and secondary sources. Probably the majority of University libraries in

the UK are primarily concerned with supporting their institutions' teaching programmes, and focus support for scholarship and research quite carefully. This is partly due to the strength of our national libraries, and also specific university libraries recognised as having collections of national value (such as the LSE, or Imperial College); it is also due to the strength of our collaborative networks, and systems for referral and resource sharing, which SCONUL members have developed over the years. But among those whose collections support teaching more than research, some are geared to the UK Government's agenda of "widening access" (encouraging able people to come to University from parts of society which traditionally had not done so); some have developed commercial services to local or regional industry (and charge for use of these services); some have developed a close association with their local community libraries, and with schools and colleges at lower educational levels. Then there have been moves in recent years to encourage collaboration with other domains, such as museums and archives. In the UK the National Health Service (probably the country's largest employer) has used Universities not only for medical education but also for training and educating nurses, paramedics and so on. Some University libraries (including my own) run libraries in hospitals for staff in the NHS who may also be University staff or students, or not.

Finally, many Universities in the UK reach beyond their immediate campuses. There is a long tradition of "University extension classes", effectively culturally interesting lectures not leading to an award. More recently courses leading towards University level in FE Colleges have been linked into and validated by Universities. The next stage is for the University to franchise some of its work to a partner college or institution, or to validate a programme so that the college awards a qualification of the validating university, with the students enrolling at the college, and not at the university. Some Universities have set up campuses in other parts of the world, and the programmes, delivered locally, replicate those available to home students. This is the case with Middlesex's campus in Dubai. A few Universities have no home campus, but operate entirely by distance learning (the Open University, the UHI). Another effect of this trend towards outreach has been the increasing numbers of international students coming to the UK, sometimes for a whole programme, sometimes for a final year. Middlesex University currently has the largest overseas recruitment of any University in the UK, and has expanded this area of business rapidly.

What all this illustrates is the very wide variety of University provision in the UK. The libraries serving these are organised in ways to support the mission of their own institution, but they can also rely on support from the libraries of other institutions, even when the Universities themselves are in competition with each other to recruit students. In some ways there is more likelihood of support for a modern, widening access, teaching focussed institution (such as Middlesex) from a traditional, elitist, research-focussed institution (such as UCL), since our strengths are complementary and we are not in competition. In fact Middlesex and UCL collaborate at a large hospital-based medical campus in North London, and as it happens, it is Middlesex which manages the library, while at another hospital, where UCL and Middlesex teach, we are looking to UCL to manage a joint library. But even among libraries serving similar clienteles, there is a remarkable spirit of co-operation. And across all of them there are many models, not just one right one, of organisation.

5. The library within the institution

Before turning to consider issues of internal library structure I want to reflect on the position of the library within the University: who does it report to, what committees of the university does it relate to or is it represented on? How do we deal with structural isolation, where the library does not appear to relate to the academic departments, or to parts of the administration? Or is isolation actually a good thing?

I firmly believe that the library ought to relate closely to the academic structure of the University in its internal organisation, so that appropriate members of staff can represent the library to, and receive feedback from, their academic colleagues. Some years ago in France I

observed a situation where the University library existed as an entity in its own right, reporting to the Minister of Culture and Libraries, attempting to serve the needs of academic staff and students, organised into Faculties, which reported to the University Rector, and to the Education Ministry. I believe this situation has moved on, but the situation then was that the University Librarian had to work very hard to find out what the University was planning and doing, and had to set up informal networks to gain information for planning and service provision. This is not the situation in the UK, but there are still cases where the library is effectively marginalised, which will reduce its effectiveness, and thereby waste resources. Since I came to Middlesex I have found myself reporting to various members of the Directorate (or Executive, now). At first it was the Academic Director, to whom the Deans of Faculty reported. That struck me as logical, although at the time the Academic Director was not particularly effective himself, and I had to work hard to establish good relations with the Deans. Then I reported to the Corporate Services Director, alongside the Computing Service (which was good in another way, which I will come on to later). Organisations evolve, and we have been through many re-organisations in the last fifteen years, so at times I have sat beside the Head of Finance, the Head of Estates, and the Academic Registrar, reporting to one or another Executive member. Recently I went back to reporting to the present Academic Director, a very much more energetic and effective person than his predecessor. And this has changed again, and I now report to the Director for Research.

Over these years I have endeavoured to join, or be active within, a number of Committees, both academic (e.g. Academic Board, Academic Standards and Quality, Programme Planning etc) and also those concerned with resource allocation and planning. I have also made sure that my library managers have been included on the appropriate School committees. Sometimes this has required patience, since requests to be included are not always successful. But as the benefits become apparent to the academic community of involving library staff in the planning and management of the University, so these requests are easier, and the invitations to join are made spontaneously in advance of any request. The benefits of participation in University Committees are that the service becomes, and is seen to be, responsive and indeed proactive, and the satisfaction of students and staff (which is one of our measures of academic quality) increases.

6. Internal structure.

There are essentially three kinds of internal structure than a University Library can adopt. It can match the University's faculty structure, with senior staff leading teams relating directly to Faculties, or Subject groupings. It can organise itself according to library functions, such as Reader Services, Technical Services, Collection Development and so on. And, where appropriate, it can take as its major organisational driver the physical structure of the University: this is particularly appropriate to Universities with several campuses relatively far away from each other. In practice these structures are not mutually exclusive. A Library may be organised both with a Campus and a Faculty dimension to its structure, or with the Faculty structure overlaid on a primarily Functional approach. In the case of Middlesex University, which had until recently some 13 campuses (6 large and 7 small), none near any other, we adopted the Campus as the dominant feature of our structure. Later on our Faculties (we call them Schools) spread different programmes onto several campuses, and now we overlaid the School structure on top of the Campus one. And now the University is concentrating all its Faculties onto one large campus (more or less), so we are in the process of restructuring according to Function, though with clear links to Faculties. All this presupposes that there is one Library structure for the whole University. In the UK it is relatively rare that we find separate Departmental or Faculty libraries, independent of the University Library. This does occur particularly in our oldest Universities, Oxford and Cambridge, and in some of our Research focussed Universities (e.g. Sheffield). It is of course more common in Europe, and is particularly found in countries which follow the German academic traditions.

As I said earlier, University Libraries in the UK are very diverse. In effect no one structure is exactly like another. There are different considerations for the Civic University with a very large campus (Birmingham), or for a University which has buildings concentrated in one part of a town covering perhaps many hectares, and not a coherent campus (Sheffield). The Universities established in the 1960s and 1970s were set up with a single purpose built site, often some way out of town (York): here the University Library is likely to have a simple coherent presence. In London, several of the major University Colleges (effectively Universities in their own right, except that they all offer University of London degrees) are spread right across the Inner City (Kings) and rely on the transport network for physical contact. I've already indicated that my own University is spread across a wide area, but in our case it is the outer suburban villages of the metropolis, and transport links between all sites are frankly inadequate. And then we have some spread across a county (Staffordshire) or even a region (Highlands and Islands).

7. Communication issues

This very neatly leads into communication issues, which become more important, the more scattered the physical layout of the University, or the complexity of its Faculty or academic structure. Technology is hugely important – but which is appropriate for holding the structure of the Library together? Which technologies will permit those lateral links across vertical hierarchical structures to work, so that staff can share skills and initiatives across teams with different management lines? Remember that I noted that structures may well have different dimensions overlaid on each other. How does a Library with a weak functional arrangement build up project teams to develop new functions (such as the exploitation of electronic information sources) across its various Campus or School teams?

Not all communication solutions are technical. A lot can be achieved through a programme of visits and planned meetings, which allow managers with responsibilities across various lines to maintain and develop contact with staff. If travel is an issue (as it is for those Library systems spread across wide areas), then telephone and e-mail obviously overcome some problems. E-mail, however, is a two-edged sword, and its informality, and immediacy can sometimes cause confusion and misunderstanding, if a private thought, ill-expressed, is shared too widely by the press of the wrong button. At Middlesex we have experimented with video-conferencing in an attempt to provide personal contact and visual stimulus for small group meetings, and also with voice over datacomms (Skype), using the computer as a sort of telephone, in addition to its primary functions.

The discipline required to make effective and economical use of video conferencing implies staff training also, and I would advise people to plan carefully before going to the expense and trouble of setting up a system. If the issue is one of simple communication (as opposed to collaborative working on a digital product) the telephone and telephone conferencing are much simpler. We have trialled another powerful approach to communication amongst library staff spread across campuses and into different teams. At Middlesex University we use Vista as our institutional VLE. We also use it for internal communication, training and induction amongst Library staff. Effectively, we treat the staff as a cohort of (quasi-) students, and use the various features of the VLE to store documents, instructions, schedules, policies, minutes of meetings and structure charts. All staff have their own password to this closed group and can keep themselves informed and up to date. There is a chat room facility, and staff can exchange views, and so contribute to planning and policy formation. I know of at least two other Universities who use their VLE for similar purposes.

I referred earlier to the need to establish systems for lateral communication among staff between the different teams. In all but the smallest and simplest University, the library staff structure is likely to be a matrix with at least one, possibly more, subordinate axes. It is important to establish who reports to whom and how. This should be transparent, so that staff are aware when and how they can communicate both upwards and downwards, and also across the structural network. Meetings, including 1-1s, group meetings and visits, need to be

announced in advance, and newsletters, attachments of notes of related meetings and postings on the VLE staff area all contribute to this. Given that a normal complex structure will include Functional groups (Subject Librarians, Circulation Librarians, Cataloguers), and maybe Project groups (E-resource development, planning a new library) as well, there is a huge potential for crossed wires and mixed management lines. If the structures are publicised, however, we can hope to overcome this danger. At the same time, I personally enjoy a bit of creative tension, engendered by bringing together staff from both axes of the matrix. The ideas generated by Subject Librarians can be realized with the technological expertise of the Systems Team. The different approaches of two campus library teams to the same problem (say, teaching students internet search skills), can prove mutually enlightening.

8. Converged services

In the UK a number of Universities have used the development of ICT as a spur to organising their academic services into larger and more complex structures. These might include Academic Computing support, the Computing Service as such (concerned with network and hardware installation), the Management Information Systems group, Audio-Visual support, and other Learning Support services including language teaching. Sometimes Printing, or Telephones may be included. As usual the Universities who have pursued this route have done so in different ways and for different reasons. About 40 of the 170 libraries I mentioned earlier have converged services, and a further 35 are managed by a Head who has responsibility for some other academic service, but without a merged structure below the Head. This is a very simple picture which, in detail could be a lot more varied. It is interesting that there seems to be no correlation with other aspects of the University scene. Each type of convergence, as well as the totally freestanding library, occurs across all types of university (Old and Modern, teaching- or research-focussed, single or multi-campus). There are several reasons why a University may choose to converge its library and other academic services. These include financial savings (efficiency); response to user demands (one-stop-shop); response to opportunities offered by ICT. Note that convergence in academic support is not just a library issue, but is strongly framed by, if not driven by, ICT developments. So we find cases of convergence between computing and audio-visual services, or library and audio-visual, or library and learning (i.e. study skills) support.

I mention convergence, because it seems to be popular in the UK, and also in Australia, but not to be particularly a feature of academic libraries in other parts of the world. Nevertheless, whatever the organisation and structure, it is the practical issues of communication which make structures work. In many of the converged services in the UK, the term Learning Resources appears somewhere in the name of the service. This flags up the point made earlier, that to deliver support to students in the 21st century, connections need to be made between the different elements (library, IT, language support and so on). How the university chooses to do this is a local matter. But it is no accident that over half the universities in the UK have chosen wider institutional groupings of Learning Resources functions than the single Library or IT department. And many of us do, as we do, and link those services quite formally with the delivery of academic programmes by Faculties.

9. Middlesex experience

I have alluded to my own University and its experience throughout this talk. I want to put this into the story of our development . The University was so designated in 1992, and had before that been called Middlesex Polytechnic. It was the last of the Polytechnics, envisaged in 1965 by the then Labour Government, to be formed, and in 1973 it was itself the product of a merger between two Colleges of Technology, a College of Art and a Teacher Training College. All these had a reasonably long history, in some cases over 100 years, and all were engaged in degree work at postgraduate as well as undergraduate level, as well as some research. For

various reasons, the Polytechnic never planned to move onto one main site, but remained working from its original college bases, scattered across various boroughs in outer North London. From the outset there was a vision of convergence of Learning Resources, though initially these were separately managed. By the time I was appointed Head of Library Services, the responsibility for Media Services (A-V) had been added to the post (a financial saving).

About the time that Polytechnics were redesignated as Universities, by Act of Parliament, the (new) Vice-Chancellor invited me to head up a larger converged service. It was to contain Library and A-V, but also Computing Services (apart from Management Information), and we called it (inelegantly) Information and Learning Resource Services. ILRS then became a vehicle for (a) mopping up problems (Print, Language Centre) and (b) staff savings. But it also (c) grew from my conviction that libraries could not operate in a separate box, out of context from computing services. The Learning Support role became mixed up with "Learning (i.e. teaching) Development" and for a while, the Deputy Librarian was also responsible for providing support to academic staff on developing new ways of teaching and learning. Gradually we realised that this was an impossible load, and required two separate units, one for the Library and one for Learning Development. So we diverged that part of the service, and now work far better with the Centre of Learning Quality and Enhancement, which is spearheading our institutional VLE, as well as promoting pedagogical methods and innovations to academic staff. Partnership is sometimes a stronger model than total convergence. In 1998, following a review of the University's structures, the (next) new Vice-Chancellor decided to bring Management Information (largely administrative software and training) back together with the main Computing Service. I insisted on retaining a group of computing staff to provide academic computing support to students, and this, too has proved a successful partnership with the main Computing Service. We are able to provide the user context for the introduction of new systems and software. And to simplify pronunciation we adopted the shorter name, Learning Resources (sometimes known as LRS, Learning Resource Services).

Believing as I do that the Library must reflect and match the University's structure, we are continually developing LRS' structure away from one based solely on Campuses to one which recognises the School. While we have operated on separate campuses, each Campus has a

Learning Resources Manager, but that person also has a liaison function to the School, and is responsible for co-ordinating LRS staff wherever they are, in the service of that School. This in turn means working through other LR managers, so as not to confuse the line management structure. Recently also we have been considering how far to set up Functional teams as such. Already the Language Centre, and within that, the English Language and Learning Support Group, operate across all campuses. With the growth of electronic delivery of scholarly information, we have set up a Distant Learners Support Unit. Incidentally, what this does is to deliver Helpdesk support via a Web interface, so it not only helps our students in Dubai, but also on-campus students who, for whatever reason, do not want to or cannot approach a physical Helpdesk.

Consequently, the structure of LRS is continually developing. This is the common experience across Higher Education in the UK. It is challenging that we are doing this against a background of reducing central budget allocations, itself driven by the UK Government, who, despite the rhetoric, are driving Vice-Chancellors and their Universities to achieve ever greater efficiency. In consequence, LRS, together with the rest of the University, has had to find ways of raising direct income. Being converged, and containing as we do the staff who provide English Language support, and who run pre-sessional courses in academic English, we do have one immediate source of income, which I have argued that we should keep, as we are helping with student recruitment. But we also are able to offer our library services to partners, particularly within the NHS. As well as recruiting NHS staff onto appropriate courses in Healthcare, we offer the rest of the staff at our partner hospitals full rights of access (as against reference only) to our library services. The contract that the University has with the NHS recognises this, and money flows through to the library as a result. Other groups can be offered

similar full rights for a fee, and an instance is the range of Psychotherapy institutions, who are our associates enrolling their own students, but awarding our degrees. The DLSU Manager has to negotiate a Service Level Agreement with each associate institution. Normally they want to use our electronic journals, which is quite problematic, given the restrictions on sharing access under the various licences publishers offer.

10. Conclusion.

So far I have made no mention of specific library products, apart from passing references to e-information. As I said, this is more the province of my colleagues. What is relevant however, is my belief that the purpose of librarianship in Universities is to actively enable the student to learn more effectively. The common thread that runs through LRS is one of learning and indeed learner support. It is for this reason that the alignment of the library with the University's academic structure is essential. It enables staff in the Library to be assimilated into academic teams in appropriate ways. This makes collection development relevant, it provides for realistic specification of resources by academic staff, and it involves the librarian to some extent in the teaching process. They also have the chance to become involved in programme design and delivery. This has at last been recognised at Middlesex. For a few years, as a result of a government initiative, we have had some of our academic staff designated as Teaching Fellows, with a responsibility to develop new ways of teaching and learning and to share these with their academic colleagues. This was followed by the institution of a similar role for academic support staff: we have now Learning Support Fellows, and I am delighted to say that at least five of our Subject Librarians have been so designated and rewarded.

So in conclusion, I hope I have shared with you the rich and varied ways in which University Libraries in the UK are organised, and the ways that this organisation can be made to support the work of the University as a whole. In particular, I hope I have shown that, with the ever changing and developing ICT scene, a holistic approach to providing Learning Resources is essential. And I want to wish you good fortune in the challenges which lie ahead of you in Armenia in developing your library services and learning resources, and being alert to the opportunities that can be taken when active staff and appropriate technology are supported by flexible and responsive structures.

USING TEMPLATE PROCESSING TECHNIQUE IN THE PERVASIVE E-LEARNING SUPPORTING SYSTEMS

Siranush Sargsyan, Anna Hovakimyan, Sergey Barkhudaryan
Yerevan State University,
Yerevan, Armenia

Abstract:
This paper presents a methodology of platform independent and learner-oriented learning environment design. Taking into account a user's requirements and standards of presenting information this methodology is applied in Course Template Language (CTL) implementation.
The template processing technique is chosen as a basis of implementation. The general idea is transformed into several separate solutions comprising together a toolset for development of any CTL environment and by this making CTL specific solutions novel and important for further implementations and extensions.

1. Introduction

One of the aspects determining that a nation is developed, is the level of education. Education is an important factor of nation's progress to develop productive power of that nation, for its culture, science and technical progress.

Traditional methods of education, its structure, forms of teaching cannot perfectly satisfy the modern requirements. Today a real tendency is observed to improve and sometimes replace the old methods of teaching with the new ones. The role of modern computer techniques and information technologies is very significant in implementing newer methods. E-learning becomes the inherent part of education and has a specific role which gives the student a proper possibility to get knowledge online , at any time and at any place.. Different Learning Systems support this kind of learning process. These systems provide didactic support for learning enhancements, give practical advice to learners, facilitate learning with new technology, provide the teaching, testing and evaluating.

Nowadays for Armenian realty more actual are the problems of adapting, disseminating, modifying of existing tools and methods designed for virtual learning environments. Due to the language problems such tools should have Armenian language interface, and must allow communication also in Armenian language.

Our activities we are developing in the following directions

- Identifying of state of the art tools and methods for virtual and hybrid learning environments.
- Identifying and implementing new learning, testing and evaluating concepts.
- Establishing and identifying basic sets of pedagogical guidelines and scenarios.
- Developing, implementing and evaluating of a teacher support system on new learning technologies.
- Developing methods for creating e-courses and virtual environments for laboratory studies.
- Developing of teaching support system to provide pervasive e-learning technologies.
- Creation of user-adaptive teaching environment for pervasive e-learning.

In the Yerevan State University various learning resources are created to support pervasive e-learning.

1. The basic toolset TeachArm that supports e-learning[1]. TeachArm system can be used both in organization of the e-learning process and in students' individual work. The user can interactively learn, test his/her knowledge via the self-tests, and pass the test for the whole e-course. The system consists of the following components: Teaching subsystem, Testing and Certification subsystem, Registration subsystem and Help module.

2. E-courses on Biology, Chemistry, Ecology, Armenian History, and Informatics in Armenian language are developed. The courses are part of the TeachArm system and disseminated on CD. The courses are used in secondary schools of Republic of Armenia.
3. Learning material of the courses is structured via standards of Distance Learning Systems (WebCT, E-Learning Server3000) and corresponding versions of the courses are created and integrated into distance learning environments. A quiz mechanism is used for testing and certification.
4. A virtual environment is developed for laboratory research [2]. Laboratory research essentially will complete and supplement the theoretical course, providing a more thorough and deeper acquirement of the learning discipline. In Virtual Laboratory the learner can make the traditional laboratory experiments in organic and inorganic chemistry. The created environment allows carrying out experiments virtually, to observe experiments' results by visual effects such as chemical formulas and animated molecules. The same experiment can be done many times with different substances with different proportions to receive deeper knowledge about investigated chemical reagents. The colorful didactic materials, illustrations and different multimedia animations for chemical experiments make learning more interesting and easy for digestion. Laboratory study is accompanied with recommendations, advices and remarks.

We develop and promote the adoption of our learning resources for interoperable learning technology via standards. Suggested specifications will help to deliver learning products and services and will make them publicly available.

An actual task is to organize platform independent and learner-oriented learning environment taking into account learner requirements: choosing learning resources, their components, special services, etc.

This paper presents an approach of adaptation of learning resources (e-courses and e-laboratories) to be used for different platforms. The suggested approach is based on learning resources' description in specific format, and its transformation into data for interpretation on different platforms. The output format may be HTML, WML, PDF, or another one. The paper discusses an approach to build environments for implementing Course Template Languages (CTL). As a basis the well-known template processing technique is chosen. The general idea of developing CTL environment makes CTL specific solutions novel and important for further implementations and extensions.

2. Processing Infrastructure

The approach described below outlines a general way of implementation of a programming/development environment for Course Template Languages.

The well-known template processing technique [3] is chosen as a basis for CTL implementation. The general idea should be transformed into several separate solutions comprising together a toolset for development of any CTL environment and by this making CTL specific solutions novel and important for further new implementations and extensions.

A simplified mechanism of a CTL environment development could be described as follows.

CTL environment users (students, course authors) provide environment specification to the environment developers including features, parameters, options, etc., and the developers in their turn implement these specifications in a form of a software system. This implies a necessity of a methodology for environment developers to create various and sometimes essentially differing environments quickly.

A challenging opportunity is to have several groups of developers working independently within a frame of the same project, i.e., to provide mechanisms that allow the project to be

divided into separate parts for parallel implementation, and finally to be easily merged into a single environment.

This methodology is based on a special template-processing infrastructure named Template Processing System (TPS). It consists of a special interpreter of templates (TPS kernel) and an extensible set of transformation rules and output primitives. TPS performs various transformations of source data (content of course, tests, assignments and so on) entered as TPS input. Transformation rules describe input data restrictions and transformation logic of the environment. Output primitives are code portions used by the TPS kernel to generate a transformation result or, in other words, the application logic of the environment. Transformation rules and output primitives for a given application are called a template. The same rules and output primitives can be used in different templates as well.

This approach provides the necessary flexibility, since the behavior of the system is being configured via templates, and new applications can be generated dynamically via adding new templates. Environment or language changes will result in template changes instead of changing the TPS kernel.

The approach also divides a project into following separate parts that could be implemented simultaneously:

- TPS kernel
- Set of transformation rules
- Output primitives
- Set of standard, problem-oriented utilities and tools that could be used for any environment.

For example, to visualize some component of course described in a form of the CTL code, it could be translated via TPS into WML or HTML and then displayed using the existing appropriate visualization utilities, particularly the browsers.

This approach in particular brings the following advantages:

- *Common solution.* Environment developers should only have to learn only one system to create any new environment. The system should not make any assumptions about how projects should look or function. Developers should be able to change the environment using a single methodology with no exposure to the TPS kernel.
- *Separation of application and transformation logic.* Output primitives' designers should be able to specify the data sources and other properties of the template independently of transformation rules used to process the data. For the transformation rules' authors should be able to write rules that reference the data sources and properties without further intervention from an output primitives' designer to produce a final project.
- *Separation of project components.* There should be provisions so that projects could be broken into discrete components to simplify the maintenance of templates and allow for reuse in different contexts.
- *Global control over environment.* There should be a way to define one or more standard master templates used by most projects, so that changes to the overall environment could be made in one place.
- *Dynamic selection of environment style.* Given that the same data may be processed in different ways, there should be a general mechanism to select a specific environment for each project request, depending on characteristics such as user preferences, type of access, etc.
- *Reusability.* The designers of output primitives and transformation rules can use the same primitive or transformation rule for different templates.

3. Template Processing System

The aim of the Template Processing System is to produce an integrated application according to the corresponding control provided in a form of templates.

The TPS implementation is based on:

- A set of custom markup tags that are used to specify transformation rules for TPS control;
- Libraries of output primitives;
- A mechanism for merging transformation rules and output primitives in a template, i.e. to convert data in output primitives according to the given transformation rules into a single dynamically generated output.

The TPS has two inputs: a template and a source data (course content and its metadata) for processing. Output of this system is a transformed code. Process of transformation is depicted on Figure 1.

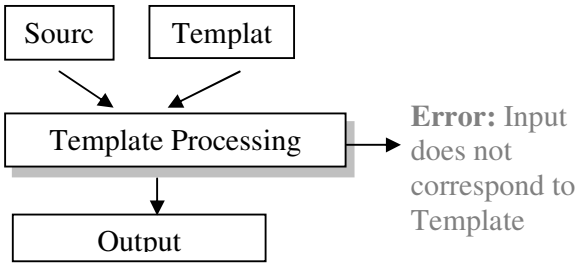


Figure 1. The code processing outline.

The overall process of generating the final application could consist of several sequential transformations, and the output of the previous transformation could be used as input or as a template for the next transformation. To control this process of sequential transformations a Script Processor (SP) is implemented as a superstructure over TPS. SP controls the sequence of transformations, inputs for each transformation, and redirects the transformation output of either into Data Library or into Template Library. This control is specified in user's requirements to learning resources given as an input to SP.

From the implementation point of view the Template Processing System (TPS) is a translator from one data format to another according to a template with translation rules and a description in input data. Template is intended to verify input data and to translate the description into the output data format for interpretation by browser to present learning material to user.

TPS implementation is based on XML technology. There are several reasons of this choice.

1. XML is a format, which is easy to parse, it reflects objects' hierarchy and allows adding new tags.
2. XML is an industry standard. There are standard libraries designed to work with XML, which substantially saves time during TPS implementation.

TPS is designed to work with plain text as input data. The text is being prepared by the course author and have some markings to outline learning material's basic components (the theory, tests, exercises etc.).

According to our approach a new XML extension was designed to perform plain text parsing and transformation into XML format. To specify these types of transformations, an XML-based language was designed. It will be referred further as TCXL - Text Conversion XML-based Language. A template format is an XML file or a set of files. TCXL consists of a set of new processing tags and functions designed to describe plain text parsing and transformation into XML format. In this case the TPS is an XML application, which reads XML template and performs input text parsing and its transformation into operations described in a form of XML tags and functions. The set of TCXL tags and functions supported by TPS is extensible. Later TPS uses standard XML extensions called XSLT (Extensible Stylesheet Language for Transformations) and XPath (XML Path Language), which are used to transform data presented

in XML format into desired format (XML, HTML, WML or a text format) in accordance with user requirements. User's requirements are specified in XML templates too, where user identifies what kind of teaching resources and in which format she/he wants to receive them.

In our implementation transformation rules for this transformation type are given in a template written in XSL format [4].

The implementation of TPS kernel and basic tags and functions is done using native Java language in the way of providing portability to different platforms. Java API for XML Processing (JAXP) libraries [5,6,7] are used for manipulating with XML.

4. Justification of the approach

The proposed approach of using TPS to build a CTL environment gives an opportunity to reuse the code-transformation engine for different purposes in the framework within e-learning. Using the same mechanism, one can solve different tasks by creating new transformation templates and new processing sequences. This methodology saves time to design a CTL environment, which is flexible enough to adapt to the language changes and expansion. Besides, it enables to solve a problem using already existing problem-oriented tools instead of creating new ones.

As such an example, we will consider the process of integrating the knowledge testing components of the course that will be displayed by WML-browser into the learning environment. To do this task we need to translate source-level data to WML-level with TPS.

This process is done using three subsequent transformations (here we assume that CTL parsing template and all output primitives are already created).

- Plain text transformation into XML format according to transformation templates and output primitives. During this step the text is checked for compliance with CTL syntax and semantics.
- Transformation using created XML code, user requirements and navigation templates. The generated output is in XML format.
- Result conversion from XML into WML format supported the interactivity.

5.Conclusion and further work

This paper presents an approach to create a dynamic learning environment for a learner which does not depend on the underlying platform and is learner adaptable. To do this we have used the technique of template processing. The development of the template toolset and its integration into TeachArm and Virtual Laboratory systems will expand their functional abilities and provide flexibility of these systems. The modification of the systems can be made in following directions:

- Testing template toolset extension;
- User interface improvement;
- Creation of new services that support the connection between laboratories and practicing classes;
- Feedback system development;
- Development of templates to support the connection with e-libraries.

According to W3C consortium standards, and particularly developing Web Ontology and Learning object, we assume to continue our activities by using OWL to describe learning courses. As we know OWL enables to describe the structure of a learning course as well as semantic relationship and dependency between different components and parts of a course. The most important and actual task for us is to construct the "Learning bucket of a user" for pervasive e-learning.

Acknowledgement

The work reported here was supported by the Open Society Institute Assistance Foundation Armenian Branch.

We would like to acknowledge head of the Dept. of Algorithmic Languages Professor S.K.Shoukourian and our colleagues who help us in our researches.

References:

1. Sargsyan S.G., Hovakimyan A.S., Darbinyan K.S., Ispiryan N.H (2003).TeachArm Toolset for e-learning Support, International Conference: Computer Science & Information Technologies (CSIT2003), (pp. 481-483). Armenia, Yerevan.
2. Sargsyan S.G., Hovakimyan A.S., Ispiryan N.H, Darbinyan K.S.(2005).Modelling and Implementation of Virtual Chemical Laboratory. International Conference: Computer Science & Information Technologies (CSIT2005), (pp. 628-631). Armenia, Yerevan.
3. S.V.Baghdasaryan, S.K.Shoukourian, An Approach for CTL Implementation, Proceedings of IEEE 6th International Workshop on Testing of Embedded Core Systems, USA, pp. 85-91, May 2002.
4. http://www.w3.org/Style/XSL/ - Extensible Stylesheet Language.
5. http://java.sun.com/xml/jaxp-1.1/docs/tutorial/xslt/ - Overview of the Xml Stylesheet Language for Transformations.
6. http://java.sun.com/xml/ - Java technology and XML.
7. Brett McLaughlin “Java & XML, 2nd Edition: Solutions to Real-World Problems” September 2001, O'Reilly & Associates.

BUILDING A NATIONAL FEDERATED ACCESS MANAGEMENT INFRASTRUCTURE (THE UK EXPERIENCE) [1]

Mariam Garibyan
London School of Economics & Political Science Library
London, UK

ABSTRACT
Libraries and service providers around the globe have been struggling to manage access to online resources. The UK Joint Information Systems Committee (JISC) has been supporting access management services for the UK Further and Higher Education communities for many years. For over ten years JISC has provided Athens, a centralised access management service. However, the need for more secure and simplified access to e-resources of all kinds, the support of complex e-learning and e-research collaborations and the need to allow institutions to take greater control over access to resources have led JISC to investigate new technologies.
Over the last few years a new generation access management architecture, based on federated technologies, such as Shibboleth, has gained increasing international recognition. The Shibboleth technology from Internet2 can provide a much-needed open source global standard for access management. Shibboleth and the architecture it supports enable secure and flexible access to restricted electronic resources without the need for individual registration and multiple access control mechanisms. In the UK, federated access management, based on Shibboleth, will be used as the standard architecture for access management for the education sector.
This paper looks at some access management solutions currently in use, outlines the main benefits of using federated access management, and explains what Shibboleth is and how it works. The paper gives an overview of UK federated access management activities. The paper draws on the experience of the London School of Economics & Political Science, one of the earliest adopters of the new technology in the UK, to illustrate typical university requirements for an access management system and to provide some practical examples of using the new technology.

KEYWORDS (for online searching)
Shibboleth, authorization management, authentication management, authorisation management, access management, federated access management

1. INTRODUCTION

With the rapid expansion of the Internet and WWW in recent years, managing access to electronic resources, such as electronic journals and databases, has become a vital part of day-to-day running of many academic libraries across the world. However, restricted electronic information is often made available via disparate systems and widely ranging access mechanisms, such as multiple usernames/passwords, IP range recognition, and Proxy servers. Until recently, there has been no effective solution to this problem. Shibboleth, open source software under development from US Internet2 (Internet2 Shibboleth Project website 2007), is an emerging global standard for access management that enables flexible access to restricted electronic resources without the need for individual registration and multiple passwords.

The United Kingdom is one of a growing number of countries adopting federated access management that Shibboleth enables. In the UK, the Joint Information Systems Committee (JISC), responsible for Information and Communications Technology (ICT) developments in UK post-16 education, has recently decided to use federated access management as the main information architecture for the UK education sector (JISC 2007a).

This paper will describe what Shibboleth is and how it works. It will also examine some of the existing access management solutions and outline the reasons for transferring to federated access management. The paper will provide an overview of UK federated access management activities to date and give some practical examples of using Shibboleth.

[1] URL for this paper and the PowerPoint presentation given at the ITE 2007 Conference in Yerevan, 21-23 May 2007 is http://hdl.handle.net/1988/2842

The London School of Economics & Political Science (LSE) was the first institution in the UK to start testing federated access management technologies, such as Shibboleth. Since then, the LSE has been involved in a number of federated access management initiatives in the UK and abroad.

2. FEDERATED ACCESS MANAGEMENT: THE UK EXPERIENCE

2.1 Requirements for a 21st century access management system: the LSE example

The London School of Economics & Political Science is a world-class university, teaching and researching in a specialised field (Social Sciences). LSE students and staff frequently work off-campus - but they still want access to all the services and information sources we provide. The LSE Library (the world's largest library specialising in the Social Sciences) is also used by researchers from many other universities, governments, and other organisations.

Just like any other university user in the UK, LSE users are tired of having to use a wide range of access management solutions to access the online resources LSE subscribes to and would like the LSE Library to provide:

- **Single sign-on (as far as possible)** to our own services, and to all the resources we subscribe on their behalf, so that they do not need to remember so many passwords for different services any more;
- **Access from anywhere** (from home, travelling, or working at other institutions or libraries);
- **Improved privacy** of personal information, and of research being pursued

LSE Library staff, who have to provide LSE information services, also have a number of requirements for a 'perfect' access management system:

- **Improved security for licensed resources**, so publishers LSE deal with are happy (and generous!);
- **Good privacy protection for users**, to meet LSE legal obligations
- **Low-effort support for LSE on-campus and mobile users**
- **Opportunity for 'fine-grain' authorisation control**, so LSE Library staff can know (and manage) *Who-Has-Access-to-What* (e.g. to be able to provide access to a selected group of users, such as first-year law students, which is currently very complicated)
- **Access for visiting users** to whatever they are entitled by their home institutions (but without necessarily having to know what that is!)

2.2 Some Current Access Management Solutions

Some current solutions to limiting access to online resources and their shortcomings are identified below:

- **'Shared' passwords**. The major problem with 'shared' passwords is that it is far too easy for a shared password to become known outside the intended community, which would in turn compromise resource security.
- **Registration of individual users, for individual resources**. There is usually no problem with sharing personal information with an organisation that has some kind of business relationship with a user, such as a university library. However, when it comes to sharing personal data with external resource providers, the situation can be quite different. For example, some users may not be willing to disclose their identity to a resource provider if their reason for use of the material is commercially or politically sensitive. Also, exchange of personal data between the identity provider

(e.g. a university library) and a resource provider opens opportunities for identity fraud.

- **IP address restriction**. Although using IP addresses for access control has its uses, it is not appropriate for off-campus access increasingly required by users.
- **IP address restriction, with Proxy-servers**. Proxy-servers offer a compromise between on-campus IP-restricted access and off-campus access with the help of an intermediate server, which provides a virtual connection between the user and an IP-restricted resource. However, this approach can be technologically challenging to implement and rely on the licence permission to use Proxy servers.
- **Athens**. In the UK, a large number of restricted resources are made available via the Athens system (Eduserv 2007). Athens is a national service established in August 2000, which allows libraries and resource providers to outsource the management of individual usernames and passwords to a central service. The service is funded and supported by JISC. However, the costs of this service are significant, the protocols it uses and the software that must be installed by a resource vendor are proprietary, and such a centralised database approach is not a scaleable solution for the future. In addition, Athens is an example of an identity-based access management service, where details about the user's identity are passed from the institution (acting as an identity provider) to the service provider in order to enable access to a resource, thus making it vulnerable to identity theft.

2.3 Reasons for change

So, why change? The above examples, hopefully, demonstrate that a more effective access management solution is badly needed to overcome the identified problems. In particular, there is a need for:

- off-campus access (licence permitting),
- a global standard (unlike UK-specific Athens),
- improved security for resources,
- improved privacy protection for users,
- distributed/ devolved access management as an alternative to identity-based access management (unlike a centralised service, such as Athens, where universities and service providers outsource the management of passwords to an external service, with devolved access management an identity provider – e.g. a university - does authentication of its registered users and a service provider - e.g. a publisher - does authorisation)

All these requirements can be met by federated access management, based on the new Shibboleth technology.

2.4 Shibboleth Technology

What is it?

Shibboleth is a technology that enables federated access management. Shibboleth, developed by US-based Internet2, is an open source reference software implementation based on the OASIS SAML (Security Assertion Markup Language). Shibboleth is an architecture for access management that allows an individual access to a resource based on their role rather than their identity. This means that the resource provider does not need to know the user's identity in order to establish the user's eligibility to access restricted information. Instead, Shibboleth makes use of role-based attributes. Role attributes are details about the user (but not their identity!) that help establish whether the user should be given access to a protected resource. For example, role attributes for a student could include information about the student's affiliation with the home institution (e.g. a registered student), details about the course, study mode, year of study etc.

Shibboleth uses the eduPerson schema (EDUCAUSE 2007), which provides a small common set of widely used user attributes in Higher Education.

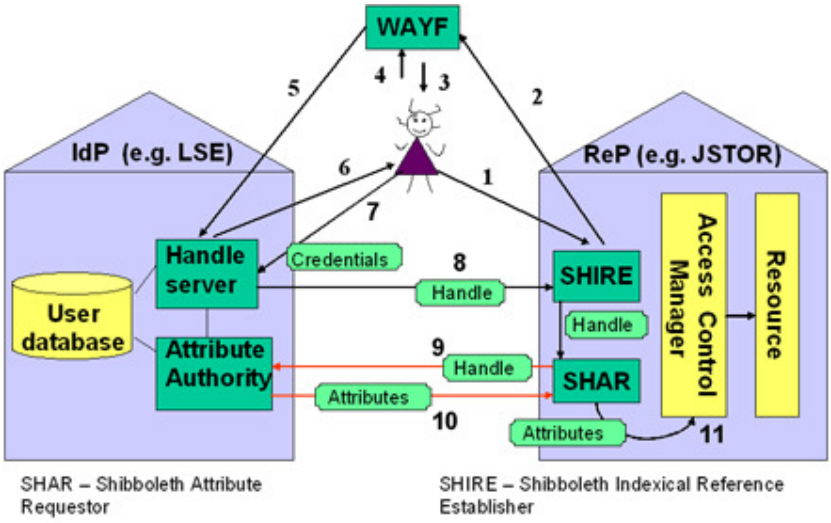
How does it work?

The role of Shibboleth is to securely 'transport' role attributes between the Identity Provider site (e.g. a university library) and Resource Provider site (e.g. a publisher) to determine whether the user should have access to the restricted resource. Most Shibboleth operations are invisible to the user. In order to access a variety of information resources, the user only needs to know the username and password given by the home institution.

The trust architecture of Shibboleth is based around the idea of a federation. A federation is a group of Identity and Resource Providers that agree on a set of common policies, such as the use of attributes.

The UK education sector has now got a national federated access management federation called the UK Access Management Federation for Education and Research (UKERNA 2007). There are other countries that already have national federated access management federations, such as US (inCommon), Switzerland (SWITCHaai) and Finland (HAKA).

Below is a simplified Shibboleth architecture diagram, based on an original diagram designed by the Swiss Education and Research Network (SWITCH).



WAYF – 'Where Are You From' Server

The Shibboleth system requires four major components:

- The user that wants to access a protected web resource, with any web browser
- The Identity Provider (IdP), with installed Shibboleth software - the institution with which the user is registered (e.g. a library, university, 'virtual' organisation)
- The Resource Provider (ReP), with installed Shibboleth software – the website that hosts the resource that the user wants to access (e.g. JSTOR). As access to the required resource is restricted, the Resource Provider has an access control system to decide whether the user should be allowed to access the resource, and if, yes, at what level.
- The 'Where Are You From' (WAYF) service. This is a 'central' service, operated on behalf of a Shibboleth Federation, which provides a list of organisations whose users may access the resource.

PLEASE NOTE Some Resource Provider technical components are now more commonly known under different names:

- Resource Provider (ReP) is now called Service Provider (SP)
- Shibboleth Indexical Reference Establisher (SHIRE) is now called the Assertion Consumer Service (ACS)
- Shibboleth Attribute Requestor (SHAR) is now called the Attribute Requestor (AR)

In the diagram, Alice is a student at the London School of Economics & Political Science (LSE) who wants to access an article available via an electronic database (e.g. JSTOR).

Phase 1. Connection to the resource

1. Alice can either click on the appropriate link on the LSE Library site or navigate to the resource using her web browser. Access to the resource is protected and so requires proof that Alice is eligible to access the resource.
2. The Shibboleth software redirects the browser to WAYF.
3. The WAYF server displays a web page with a drop-down menu from which Alice selects her 'home organisation' (LSE).

Phase 2. Authentication with the 'home organisation'

4. When Alice selects her home organisation (LSE), her browser returns her selection to WAYF.
5. WAYF then redirects her browser to the LSE Handle Server. The Handle Server has access to the user database and 'knows' how to authenticate a user based on his/her credentials (e.g. username and password).
6. The Handle Server produces a standard LSE web login screen. Alice enters her LSE username and password. (Although, as the standard LSE web login service supports 'Single Sign-On', Alice will only be required to authenticate herself if this is the first protected resource, anywhere, that she has accessed during this browser session).

Phase 3. Redirection back to the resource

7. The Shibboleth IdP software sends the browser back to the resource site and includes some security information (user credentials) confirming that the user has been recognised by the IdP (LSE).
8. Provided the credentials are correct, the Handle Server generates a digitally signed Handle on behalf of Alice. The Handle is sent to the SHIRE (Shibboleth Indexical Reference Establisher) of the resource Alice wants to access. SHIRE passes the received Handle onto the SHAR (Shibboleth Attribute Requestor).

Phase 4. Handle / attributes verification

9. The SHAR then sends the Handle back to the Attribute Authority (AA) of the home organisation via a secure HTTP connection, requesting the attributes needed to decide whether Alice can access the resource.
10. The Attribute Authority verifies the Handle with the Handle Server. If it is valid, the AA checks which attributes (information about the user, e.g. course details) it may release to the resource based on the LSE Attribute Release Policy (ARP). The AA then sends the relevant attributes to the SHAR.

11. Steps 7-10 are completely invisible to Alice, as they just occur between the two servers.

Phase 5. Access to the resource

12. Finally, the SHAR passes the received attributes to the Access Control Manager. The Access Control Manager checks the received information and decides whether the user should be granted access. If access is granted, the user gets access to the resource.

For a live demo of how Shibboleth works, try the SWITCH Shibboleth demo at www.switch.ch/aai/demo or the PowerPoint presentation upon which this paper is based at http://hdl.handle.net/1988/2842.

Costs and benefits of using Shibboleth

Benefits

- An international solution, based on recognised standards
- Reduced costs in password support
- No difference in on-campus and off-campus access
- More flexible access control – e.g. different categories of users to different levels of access (or none) to a resource
- Sharing resources in collaboration within the academic community – providing controlled access to users from other institutions, without needing to administer usernames/passwords for them
- Setting up services as a Service Provider (e.g. Shibboleth enables some LSE services to be non-public but accessed by authorised people at LSE, such as LSE Exam Papers).

Costs

- Institution's user directory must be in good shape and set up to support Shibboleth Identity Provider (IdP) software
- Shibboleth software needs installing and maintaining

2.5 Federated access management developments in the UK

As mentioned in the introduction, the JISC is the main driver for federated access management developments in the UK. JISC is funding the UK access management federation and is encouraging all UK Higher and Further Education institutions (641 institutions in total) and service providers to join. JISC is also providing various support mechanisms to help institutions and service providers adopt the new technology, including the UK federation website (UKERNA 2007) and JISC federated access management pages (JISC 2007b). Another important area of work for JISC is liaison with national and international partners, such as Internet2 and SWITCH.

JISC will stop funding Athens by July 2008 after which it will become a subscription-based service.

2.6. Some examples of federated access management in use

Federated access management technologies, such as Shibboleth, can be used in a variety of ways. Below are examples of just some of the possible ways in which Shibboleth can be used.

Enabling access to an external commercial resource

LSE, alongside many other UK universities now provides access to the majority of the commercial electronic resources it subscribes to via Shibboleth.

Resource sharing between two institutions

DART (Digital Anthropology Resources for Teaching) was a collaborative project between the London School of Economics and Political Science (LSE) and Columbia University, New York. The project aimed to develop and share digital anthropological resources for undergraduate students (Columbia University 2005). DART was funded by the National Science Foundation (NSF) and JISC for the period of five years (2003 – 2005). DART used Shibboleth to enable resource sharing between the two institutions.

Managing resource submissions to an open source digital repository

Universities worldwide are increasingly taking steps to enable free sharing of their scholars' outputs, such as research articles, through making their institution's scholarly information available via open access digital repositories. A popular choice for an open source digital repository is Eprints.org software. Access to materials contained in an Eprints repository is free and does not require access management. However, in order to deposit materials in a repository, some access management mechanisms need to be in place in order to control how materials are selected, what metadata is used etc.

The ShibboLEAP Project funded by JISC (LSE 2007) is an example of the important contribution that Shibboleth can make in the area of scholarly communication. ShibboLEAP was a collaborative project involving seven colleges of London University, which are members of the SHERPA-LEAP consortium. The SHERPA-LEAP consortium is investigating the future of scholarly communication and publishing. In particular, it is developing E-prints open-access institutional repositories in a number of UK research universities. ShibboLEAP created a Shibboleth Identity-Provider service for each of the partner institutions and integrated the ePrints.org server to enable it as a Shibboleth Service Provider.

3. CONCLUSION

To summarise, federated access management technologies, such as Shibboleth, meet the requirements of a modern access management system. Shibboleth does not require management of a large centralised database of users, unlike traditional access management models, which makes it highly scaleable. Shibboleth provides a flexible and secure access management architecture capable of supporting a range of access scenarios and applications, as demonstrated by the three real-life examples given earlier. Shibboleth is open source and free (although there are, of course, some costs in implementing and maintaining the new service). Although the software is still under development, it is quickly gaining momentum. National bodies in a growing number of countries are either already actively using Shibboleth or testing it, including the USA, Australia, Switzerland, Netherlands, Spain, France, Denmark and Finland. Major service providers, including Ovid, ScienceDirect, Elsevier, JSTOR have adopted Shibboleth and the list is constantly growing. Shibboleth is also increasingly used by open source applications (e.g. ePrints, Dspace, Moodle) and to provide access to non- commercial applications to which access is restricted.

For all the above reasons, the authors are confident that Shibboleth should be considered the emerging global standard for access management, which should be taken seriously by the academic and publishing communities.

References:

1. Columbia University, 2007. *DART Project Homepage* [online]. New York: Columbia University. Available at: <URL:http://www.columbia.edu/dlc/dart/> [Accessed 08 June 2007]
2. EDUCAUSE, 2007. *EduPerson Object Class* [online]. EDUCAUSE. Available at: <URL:http://www.educause.edu/content.asp?PAGE_ID=949&bhcp=1> [Accessed 08 June 2007]

3. Eduserv, 2007. *Eduserv Athens for Education* [online]. Eduserv. Available at: <URL:http://www.athens.ac.uk/> [Accessed 08 June 2007]
4. JISC, 2007a. *JISC Homepage* [online]. Joint Information Systems Committee. Available at: <URL:http://www.jisc.ac.uk/> [Accessed 08 June 2007]
5. JISC, 2007b. *JISC federated access management pages* [online]. Joint Information Systems Committee. Available at: <URL:http://www.jisc.ac.uk/federation> [Accessed 07 June 2007]
6. Internet2, 2007. *Shibboleth Project Web Site* [online]. Available at: <URL:http://shibboleth.internet2.edu/> [Accessed 07 June 2007]
7. LSE, 2007. *LSE Access Management Projects Homepage* [online]. London School of Economics & Political Science Library. Available at: <URL:http://www.angel.ac.uk/> [Accessed 07 June 2007]
8. UKERNA (on behalf of JISC and Becta). *UK Access Management Federation for Education & Research website homepage* [online]. UKERNA. Available at: <URL:http://www.ukfederation.org.uk/> [Accessed 07 June 2007]

USING E-LIBRARY FOR THE DISTANCE LEARNING

B.Sukhbaatar, L.Batkhishig, G.Ganchimeg
Institute of Telecommunication and Information Technology
Mongolian University of Science and Technology
Ulaanbaatar, Mongolia

ABSTRACT
Mongolia is one of the best-suited countries in the world for distance education. With herders and settlers living far away from urban areas, it is essential that Mongolia addresses their education needs in the form of distance education. Mongolia is ranked as the seventh largest country in Asia for its territory, which covers an area of 603,899 square miles (1,564,100 sq.km) with 2,598,300 population as of 2006. Now Mongolia has three independent distance learning systems: National Information Center (NIC) distance learning and video conferencing system, Distance learning system of Ministry of Education Culture and Science and "School on the Internet" (SOI). It has been developing an electronic library named "Erdem" which is proposed to be effectively used for distance learning purposes as well. It has been found that USB hard disks are much more than a storage device, it may become a personal electronic library as well. It also means that you can carry your own library and read your books anywhere, anytime and on any computer independently without having any network connection.

1. BRIEF INFORMATION ABOUT MONGOLIA

Mongolia is ranked as the seventh largest country in Asia for its territory, which covers an area of 603,899 square miles (1,564,100 sq.km) with 2,598,300 population as of 2006. About 1 milion population resides in Ulaanbaatar city, which has more than 350 years of history.

About 504 000 inhabitants live in province centres which are secondary level cities. Remaining 1 million people (most of them herders) live in remote areas looking after their cattle. They move every season in order to locate their cattle in favorable place in accordance with the season. Mongolian herders might be the one of few nations that keep their life style until now. Not only distance education but also universal services, such as the basic telecommunication service, is new for most of them. There are 340 village centres with few inhabitants who are local government workers, teachers, doctors, and law enforcement officers, whose duty is to deliver government service to the herders. Herders live around the centre within the range of 5-40 km.

Mongolia has one of the highest literacy rates 98.8%, excluding children under 8. However, this rate is dramatically going down for the reason that the number of new enrollments and school attendance are decreasing. About 700 000 students are studying in Mongolia. There are 686 primary and secondary schools, and 183 universities from the 2005 to 2006 academic year. About 250,000 students study at their village centre's secondary school. There is neither distance education nor is e-learning well used other than TV and Radio. The population is young: 34.5% are children under 15; young people age 15-30 constitute 30.6%; those aged 35-59 comprises 21.1% and 5.6% are over 69 years old.

Mongolia is the largest land-locked country and is sparsely populated. Introduction of technology based distance education is a new education form for Mongolia. With herders and settlers living far away from urban areas, it is essential that Mongolia address their education needs in form of distance education. Mongolia is one of the well suited for distance education in the world.

2. DISTANCE LEARNING SYSTEMS IN MONGOLIA

The distance learning centre of Mongolia is situated in the Institute of Telecommunication and Information Technology of the Mongolian University of Science and Technology.

It has the following 3 independent distance learning systems:

- "NIC" distance learning and video conferencing system
- Distance learning system of Ministry of Education Culture and Science
- "SOI" Internet school

"NIC" distance learning and video conferencing system

It was established in 2002 according to the contract between Mongolian and Indian Governments for cooperating in field of the Information and Communication Technology. It is connected directly to the Indian National Information Center using the satellite VSAT system for distance learning from India. International video conferences, seminars, and meetings are being organized as well (Fig.1).

Fig.1 National Information Center connection

Distance learning system of Ministry of Education, Culture and Science

In the framework of organizing refresher courses to raise qualifications of teachers and staff in other fields, and using the Information Communication Technology in all branches of education, The Ministry of Education, Culture and Science has set up a large scale independent network covering Ulaanbaatar and other major cities, and has organized training courses and seminars on topics such as "Renewing chemistry education", "Mathematical education in elementary grades." The technical solution and application of this system has been implemented by STIT and technical centre of the system is located at this school.

The A.B.Vajpai Information and Communication Technology Training Center has set up a system covering Ulaanbaatar and 21 aimags using the NIC international video conferencing system, and as the first step they have set up equipment in education, and cultural centres in Ulaanbaatar and 16 aimags and cities, such as Orhon, Darhan, Dornod, Sukhbaatar, Arhangai, Bayanhongor, Uvs and connected the system to the network (Fig.2) As the second step, we are currently setting up branches of distance learning centres in Ovorhangai, Dundgovi, Omnogovi, Selenge aimags.

Distance Learning System, and its branch centres are provided with complete set of equipment, system monitoring, management, server computer for setting up an information database, and other equipment necessary for providing sufficient learning environment from TANDBERG of Norway.

By implementing the project for setting up distance learning system, the following results will be achieved.

Fig.2 Distance learning system of Ministry of Education, Culture and Science

- Information and Communication Technology will be set for use in all levels of education
- Make refresher preparation, qualification raising activities available continuously and steady for teachers and other professional staff
- Applying distance learning and open-education technologies in higher and professional educations
- Information network has been set up for exchanging science and technology information and experiences

"SOI" Internet school

In 1997 in the framework of the WIDE (Widely Integrated Distributed Environment) project we began implementing the SOI (School On the Internet) project to deliver higher education using the Internet.

The SOI-ASIA project has developed new methods of education to give a boost to the information technology and human resource development and use it in the educational field.

Fig.3 School on the Internet

As of this year universities of 18 different countries participated in this project and it has worked as a open university and accepted students to masters' degree programs. Professors, teachers, and students from any university in Mongolia can attend training courses in their interested topics at no charge.

Web based courses are held in real-time in the University of Keio, Japan, an archive of the lecture is kept in the server computers of the branch universities and students who were unable to attend the course can access the materials and study on their own.

Branch centres of SOI-ASIA project have low-cost, easy-to-install satellite antenna receiver with UDLR (UniDirectional Link Routing) technology with 11Mbps bandwidth based on satellite communication.

3. ELECTRONIC LIBRARY "ERDEM"

Our University has started to use the Electronic library called "Erdem" which is developed to have following main features:

- It has not only searching function to find e-books but also can make it possible to read it using the computers connected to the LAN and internet as well.
- Our university has provided special e-book reading rooms for the students. In general, we can access to the e-library "Erdem" from any room of the University using the LAN network.
- We have already started to produce e-books to add to the database of the library. It is most convinient way to solve problems defficeincy and lack of paper books and some old and rare books which has a only sample.
- Now we have over 3000 e-books in the database and added 1-5 Mongolian language e-books everyday.

Some important features of the "Erdem" e-library are shown in the Table 1

Table 1. Some important features of the "Erdem" e-library

Now we are also working on the development of mobile version of the e-library. It may have very useful application for those who are studying in the distant learning environment and living in the countryside or other place without having internet access. The portable or mobile e-library can be realized in many ways beginning with the use of CD's, DVD's, portable hard disks and even on USB flash disks. We have experience to prepare CD's which contains all necessary books and educational materials for the students. But, a real mobile version of the e-library should have software which runs immediately on plugging in to the computer ("plug and play"). In this case, USB is more promising than hard disks. It may become a mobile e-library.

For example, the U3 Platform is a new standard in the USB flash drive world that takes USB drives a big step forward. It enables USB flash drives to be much more than a storage device, it may become a personal electronic library as well. U3 devices enable you to not only carry all your books with you, but your e-library application software can also travel with you.

It is easy to install the set of U3 programs you need on the U3 device, and run them from any Windows computer by merely inserting the U3 device into the USB port of the computer.

Fig. 4. The U3 program

It means that you are no longer tied to the one computer that you set up with the applications and preferences you like. It also means that you can continue to read your books anywhere, anytime and on any computer without having any network connection.

A U3 program is a special version of an application that has been created to run from flash drives. Once you install a U3 program on your device, you can run it from any Windows computer. The U3 environment ensures that the application data and settings are stored on the device. The environment also caters for multiple applications running simultaneously from the device and for the possible situation in which the device is ejected or removed from the computer while applications are still running. One of the problems of the development portable e-library application software is to make it with smaller size. We found that with a size of 250GB portable USB hard disk you can have your own personal e-library with 10000-30000 and more books depending on the size of the books.

CONCLUSION

The specific living culture and low density of population of Mongolia makes it possible to say that Mongolia is one of the best-suited countries in the world for distance education.

The existing ICT infrastructure and three independent distance learning systems of Mongolia (National Information Center distance learning and video conferencing system, Distance learning system of Ministry of Education Culture and Science and "School on the Internet") can effectively be used to create a nationwide distance learning network with extensive application of e-library.

For this purpose the "Erdem" electronic library can be used which is proposed in this paper to be used for the distance learning purpose as well. It has been found that USB hard disks may become a personal electronic library as well. It means that it is most suitable for those who study in distance learning environment and can carry own library and read educational materials and books anywhere, anytime and on any computer independently without having any network connection.

EDUCATION AND STUDENTS INFORMAL LEARNING IN THE INFORMATION AGE

Serob Khachatryan
National Institute of Education, Yerevan State University
Yerevan, Armenia

The learning process is expressed in two ways. The first form is 'formal learning', which is carried out in educational institutions—by transferring necessary knowledge and skills to members of society and by instilling values, it tries to engage learners and prepare them for life. When we speak of a well-organized education system, we mean first of all its conformity to present-day requirements and its links with and impact on social and cultural change. The second form is 'informal learning', which is not specially organized, guided, or supervised. However, that does not mean that informal learning is less important or effective. This level of learning is reflected in spare time culture, public morals, traditions, stereotypes, and myths. It is relatively effective because, as a process based upon skills and values necessary for survival, it plays an essential role in the formation of a person.

The role of informal learning is growing as a result of ICT development. ICT is playing an important role in children's life. Today's children have grown up with ICT. But in Armenia the role of ICT in schools is not growing so fast. There is an increase in numbers of computers and schools with Internet connections in Armenia.

Academic Year	**2003-2004**	**2005-2006**
Number of computers in schools	3,391	5,531
Number of schools with Internet connection	183	273

Source: Education in Armenia. 2005-2006 Yearbook, Yerevan, 2007.

In European countries also ICT is not broadly used in the formal learning process. Here are 2003 PISA results on ICT usage among school students[2].

Electronic communication – 56 %
Looking things on the Internet – 55 %
Playing games – 53 %
Word processing – 48 %
Educational software – 13 %
Learning school material – 30%.

According to Sorenson, Danielson, Nielson there are numbers of informal learning forms. Three of them are: *learning hierarchies, learning communities and learning networks.* These three forms are interconnected.

In a group of children of different ages the children's own organizational hierarchy in which the youngest learn from the older children, or beginners from those with experience exists to facilitate learning,. Children's computer use often takes place in a *community* where they sit together using the computer to play a game. Learning is a part of this communal activity, and the interaction can take place in both physical and virtual space. The research shows that there is a constant exchange of opinion in children's online activities. A network can be described as units connected.

[2] Source. Education at a Glance. OECD Indicators 2006.

When children use the digital media they establish learning networks through which they develop strategies for finding information, sharing it with others and constructing new knowledge.

Pupils bring these informal learning forms into the schools. The challenge is the following: is the school embedding these informal learning forms in the curriculum?

In the traditional industrial age, the school teacher plans teaching according to the curriculum. The main activity is class teaching. Pupils are in a passive mode, they mainly listen. The relation between teacher and pupils is power hierarchy.

This reality is not in accordance with informal learning forms. Informal learning which pupils attain in their use of information and communication technology must be taken into account in the day-to-day planning of the school's activities. Otherwise informal learning forms will become dominant in student's spare time culture. In this case school will not be the main place where students will acquire new knowledge and skills. As a result the pupils spare-time activities and informal forms of learning are colonizing parts of the school day.

Conclusion

Therefore, most of what students do, learn, make and experience with ICT tools does not take place inside school, but outside of it. The knowledge society's school must first function according to the open principle. This means that the informal learning which the pupils attain in their use of information and communication technologies must be taken into account in the day-to-day planning of school activities.

THE AREV SYSTEM : PROBLEMS OF DESIGN AND IMPLEMENTATION FOR PERSONS WITH IMPAIRED VISION

A. Kuchukyan, S. Karapetyan
Yerevan Computer Research and Development Institute
Yerevan, Armenia

Abstract
Armenian Reading Equipment with Voice (AREV) developed by YCRDI to assist persons with poor vision, is described. Problems of development and specific approach to its implementation are outlined. Main functions of the system and phased approach to their design and implementation, are briefly discussed. A glimpse into the future of the system is given.

1. Introduction

Integration of the disabled into the information society is a challenge for any civilized society. For some categories of the disabled, limited access to information is a major restriction for development and professional promotion and possibilities afforded by systems specially developed for them greatly alleviate their problems.

YCRDI has long standing experience with the design and development of computer systems and special software. Availability of specialists of different profile, have made it possible to develop a system in Armenian for information support of blind persons and persons with poor eyesight.

To develop such a system and to make it successful, it was necessary to analyze the needs of this category of disabled, to define the scope of the work and to develop means to achieve the goal in the shortest possible time limits.

It should be noted that the systems existing in the market (e.g. JAWS and others) because of language, high cost and training requirements, were not accessible to blind persons in Armenia. There was no sign of their implementation in Armenia and special schools for the blind were relying on Braille alphabet and audio cassettes.

Experience of YCRDI in training persons with different age and levels of education was helpful in the process of phased approach in developing the system for the blind and ensuring its widespread implementation.

2. Principles of AREV development

Integration of the disabled into society with the assistance of information technologies is a complex task and needs substantial financial and technical efforts. A practical approach is to achieve a maximum effect with limited resources in the shortest possible time.

Based on this approach, it was decided to develop a system for blind persons and persons with poor eyesight for the following reasons:

- There are 10000 persons with eyesight disabilities in Armenia and many more with poor vision, who may benefit from a computerized system.
- Because of severe information limitations, this category of disabled are interested in development of such a system. Contacts with the Associations of Blind Persons (AOB) of Armenia officials and disabled of different age and education showed, that they were eager to have such a system and that it may greatly alleviate their problems.
- There is an infrastructure, which supports this category of disabled in Armenia. There are special schools for the blind where children are trained to master the Braille alphabet and there are regional divisions of AOB which are in touch with their members and assist them. This will be very helpful during implementation of the system.

- Development of a computerized system, based on the ideas of YCRDI specialists, is possible within a reasonable time frame with limited financial resources.
    - The following requirements were formulated for AREV system development:
    - The system should require only knowledge of Armenian language and be accessible for all blind persons without limitations.
    - There should be not restrictions to age and education.
    - No need for assistance to blind users from other persons during usage of the system.
    - The system should be open to enhancement and modifications
    - The system should be friendly and helpful to users
    - Off-shelf equipment and low cost of licenses and training is needed to make the system affordable for users.

To meet the high expectations of the users, it was decided to design and develop the system in phases. The preparatory phase included development of principles of operation and the "Hayakn" synthesizer of Armenian language (text to speech), which corresponds to Armenian pronunciation and phonetics. For Optical Character Recognition the Fine Reader system of ABBYY company was used. The most essential part of the system are the principles of operation. Interaction of a blind person with the system only with keyboard keys, where each key or combination of keys corresponds to a certain function to be performed by the system, eliminates the need to know the Windows and operations needed for its functioning, thus greatly decreasing time and efforts to master the system.

In the first phase of development (AREV-1) only the most important features of the system were realized and implemented. In the second phase (AREV-2) the system was extended and included all possible enhancements and new subsystems expected by the users. In the third phase (AREV-3), now under development, the users will not need trainers to master the system and, thus, will have a totally accessible system at their disposal.

3. AREV main functions

1. In AREV-1 all functions necessary to correspond with a computer are included. First of all, a self-training subsystem for learning keyboard keys and functions, is included. Based on that, control functions are explained and mastered. After that, the following functions are trained:

- Entry of books and documents in Armenian by a scanner.
- Reading texts and documents in Armenian (with Haykn synthesizer)
- Entry of texts, editing and printing via keyboard
- Reading Armenian Internet sites.
- Sending / receiving e-mails.
- Chess player.
- e-library (Fiction omnibus, school subjects, Laws of Armenia, Holy Bible, etc)
- e-secretary, planner, calendar, clock, etc.

To make the system operational, a Pentium IV computer with 128 Mb RAM and 40 Gbyte HD is needed with Windows, Fine-Reader and AREV-1 installations.

The AREV system may share the same equipment with a Windows ordinary user.

2. The AREV-2 system includes all functions of AREV-1 plus several additional features, such as:

- Music subsystem (music writing, editing and printing notes, creation of music library).
- Navigating in arbitrary WEB sites, reading page content and storing it in user's personal library.
- Inclusion of all known edit functions (copy, paste, size, etc)
- Enter / taking out information by Floppy and Flash devices

- Make records, enter / take out voice by CD, enter graphics

3. A number of new features are included in the AREV-2 system:
   - **Choice of language.** (Armenian, English, Russian). Blinds may select any one of these languages by activating the corresponding function. Although languages are changed, the knowledge of Armenian is mandatory.
   - **Choice of speed.** selection of reading speed is possible (slow, normal, speeded-up, Fast).
   - **Choice of voice.** (Hayakn synthesizer may be operated in man/woman voice).
   - **Modes of operation.** The AREV system may operate in stand alone, in local network and in distant operation mode (if connected to YCRDI AREV center). Help services for all functions are included to make the system friendly to the user.
   - Screen magnifier for persons with poor eyesight is included.

4. AREV system implementation

The AREV system, as soon as it was developed, was tested on a group volunteers and, based on their comments, refinements were carried out. The system was accepted with enthusiasm and, with the assistance of all Armenian Foundation, it was implemented in the special school for children with visual impairments. High grade children were trained (Fig. 1) and worked independently with the system (Fig. 2) in a classroom equipped with PCs and AREV system.

Fig. 1

Positive results of implementation led to the opening of a computer class with 10 PCs and AREV system in the Palace of Culture of Blinds in Yerevan, where the system was tested on a group of disabled adults. A number of disabled were trained at YCRDI AREV centre, got their personal systems and now work at home or in offices.

During AREV implementation several lessons were learned:

- The process of training goes more easily than it was estimated, because of dedication of disabled and their perseverance.

Fig. 2

- although until now more than 150 disabled were trained (of different age and education), there was no single case when the training was not successful.
- this category of disabled is very susceptible to the quality of the synthesizer and even to the type of voice (man / woman). That's why the quality of the synthesizer was improved and woman voice included in the system. The speed of reading was also made changeable by the disabled.
- the "Help" service proved very important, specially comments carried out by a non intrusive woman voice.
- availability of headphones isolated trainees from each other and everybody was getting his/her training at his own pace without interfering with others. This made possible group training with LAN connections, thus sparing printers, scanners and floor space.
- there are problems of escorting the disabled to a training center. So, although many disabled would like to be trained and use the system, this impediment severely restricts their participation.

During 2006 a large scale implementation of the system took place in several schools and libraries in different regions of Armenia. Experience showed that, especially, in rural regions, where the subsistence level is lower, the problem of participation is more acute and special attention should be paid to the self training ability of the system. In case a totally self-training AREV system is developed (AREV-3), it will be possible to find sources of system delivery to individual users without escorting or training problems related to the process.

With the assistance of OSI-Armenia Foundation the large scale implementation of the AREV system has started in 2006 and continues in 2007 with development of AREV-3 and its implementation in 11 regional schools, libraries and Association of Blind Persons' centers. Thus, the functional development of the system will be over and further steps should be taken for implementation of the system with support from donors and State bodies. The state bodies should develop a concept of AREV implementation and regulations for its delivery to certain groups of visually impaired persons (schoolchildren, students, actively involved in creative process or working). Special attention should be paid to the transition from Braille alphabet to new information technologies, which, with decreasing cost of equipment and cheep license of AREV-3, will solve the problem of integration of persons with visual impairments into society.

Acknowledgements

The authors would like to express their gratitude to IIZ / DVV Armenian branch, All Armenian Fund, Association of Blind Persons of Armenia and, especially, to Open Society Institute – Armenian Foundation, for continuing support to large scale implementation of the system. No less important are expressions of enthusiasm by many individuals, which greatly encouraged the authors to continue their efforts.

COMMON INFORMATION AND COMMUNICATION INFRASTRUCTURE OF EDUCATIONAL ORGANIZATIONS OF THE REPUBLIC OF TAJIKISTAN

Ibodulloev Muchamaddi
Training coordinator of the project
"Internet for the development"
Dushanbe, Tajikistan

Abstract
Information and communication technologies (ICT) are bringing us closer to the establishment of a society, where human beings feel comfortable, and have opportunities for professional and intellectual growth, and normal conditions for development. In this process the leading elements are not ICT, but their usage for development. In the "Okinawa Charter for the Global Information Society" adopted June 22, 2000 by the heads of leading countries, it is declared that ICT is amongst the most important factors, influencing the formation of XXI century society.
The aim of the project "Internet for the Development" is the encouragement of equal access to information and communication technologies for academic and civil society, institutions of the Republic of Tajikistan, which is assisting in the sustainability of human growth, growth of the export potential of the country, and the country's effective integration to the global information community. Project efforts aim to give free Internet access to the different user groups, and also to strengthen the process of creation of new educational resources using native languages. Another project goal is enlarging usage of the new technologies as in education, also for scientific work.
For achieving this goal, priority tasks are defined for human and content development:

- Awareness raising campaigns using round tables, conferences amongst educators on benefits of using ICT;
- Increasing qualification of educators by providing training sessions and summer schools;
- Developing a portal www.maktab.tj, containing information about the schools, school web sites, completed projects;
- Creating websites for educational organizations, providing them with domain names and hosting services;
- Establishment of advisory and technical services from University students, who will help schools in more effective implementation and development of ICT.

One of the defined tasks is information support and creation of the educational organizations web portal, which contains information about the goals, ongoing activities, partners, realized projects, contact data for each organization. In this portal also it is possible to add information about news on ICT and education, calls for grants and competitions announced by various organizations, information about libraries, public Internet access points etc. Besides community schools, the subscribers of these services could be different institutions involved in education.
For realization of the project goals, and fulfillment of the proposed tasks it is necessary to integrate the efforts of all interested parties, and in this case we should receive a positive result, in particular:

- increased number of Internet users;
- increased amount of information resources in the national language;
- presence of educators from the secondary schools, with sufficient computer literacy knowledge;
- decreased digital divide in Tajikistan

THE ONTOLOGICAL SCIENTIFIC-EDUCATIONAL PORTAL

Vagan Terziyan, Prof., Doctor of Technical Science,
Head of Artificial Intelligence Department, KNURE
Alexandra Vitko, PhD, Docent,
Artificial Intelligence Department, KNURE
Nina Koreyko, PhD student,
Artificial Intelligence Department, KNURE
Kharkov, Ukraine

Abstract
A number of technical problems existing in education and science management that make access to university facilities difficult and hence their transparent evaluation has led to the necessity for the creation and maintenance of a national portal for Ukrainian scientific-educational resource management and evaluation. An ontological approach to scientific-educational resource management is suggested. Ontology-based scientific-educational portal allows improving and making transparent the process of licensing and accreditation of universities. The common structure of the portal, the main functional capabilities and mechanisms of navigation elements' interaction are described.

1. Preface

In the context of the current fashion for the integration of the Ukrainian education system into the European one, the transparency of educational process and education quality control becomes topical. As a result the amount of heterogeneous information in the field of education and science that needs to be stored, integrated, intelligently processed, quickly and relevantly searched is rising steeply. There are a few technical problems in the area of educational and scientific process management that make difficult access to university characteristics and hence their transparent evaluation:

- the Ministry of Education and Science of Ukraine uses the decentralized system of information resources registration (as a rule each department of the Ministry has own specific system for information management) and as a result the information about the same parameters can be various in different departments;
- the evaluation parameters lose currency because of a long time for databases updates;
- opaqueness of evaluation parameters forming leads to difficulties of their verification;
- rapidly developing structure of educational and scientific processes organization leads to constant changes of the software used for information management.

Thus, the advisability of storing the information about the scientific-educational area structure in special structured form and providing the special tools for distributed access to the information, convenient methods of information search, monitoring of content renewal becomes evident. The general way for organization of structured and convenient access information system is Web Portal creation.

The development of a national ontological Portal for Ukrainian scientific-educational national resource management and evaluation is constrained by the absence of a centralized knowledge base. However, this problem can be solved with a help of a new distributed system for national resource registration together with web-services for system and complex analysis of all activity components of university and its departments that are used to determine how the universities fit in with accreditation requirements fixed in corresponding normative documents.

2. Technologies Used

The effective solving of the problem stated above (creation and maintenance of the national Portal for Ukrainian scientific-educational resource management and evaluation) is possible owing to application of the leading technologies in information processing and an ontological approach to information systems development.

At the present time, the world community has accumulated some experience in software development used for designing, creation and testing of ontologies. Agent technologies for collecting, processing and sharing of knowledge in different information environments are

developing on the basis of Semantic Web technologies. There are few attendant technologies, for example, there is a possibility to create the complex of corresponding web-services which will help to interact with a developed ontology-based information system.

To a considerable degree the possibility of semantic description of information resources appears due to the use of the technologies based on the Semantic Web initiative proposed by W3C (World Wide Web Consortium) [1]. Using the Semantic Web standards for data representation is necessary for the development of new intelligent methods of semantic processing and integration of information. The ontological approach to information representation which allows an explicit comparison of single information components is the basis of these methods. It will allow the automation of the monitoring of the observance of legislative statements and normative-legal documents in the higher education area by Ukrainian Universities; monitoring of observance of educational activity realization requirements, establishing the size and structure of specialists training; establishing bachelor degrees list, master degrees list; establishing the National Registry of Educational Establishments and so on.

Using a large-scale ontology of Ukrainian national scientific-educational resources as a basis of the Portal makes the Portal knowledge system easily extendable and customizable – new knowledge and new types of information resources can be integrated into the system. Using a large-scale ontology also allows the mechanisms of information comparison and analysis to make an intelligent processing of Portal information content.

The possibility of semantic processing of knowledge specified by the ontologies gives priority to the ontological approach relative to other alternatives while the technology for educational process transparency ensuring is selected. As a comparison there is a need to mention that widely used database technologies don't provide such capabilities: different database management systems can't interact with each other, special middleware should be developed for their integration.

Thus, the development of distributed ontological system for Ukrainian national scientific-educational resource management and evaluation as a national Portal seems to be reasonable.

The idea and the detailed project application for ontological scientific-educational Portal creation was developed by Artificial Intelligence Department of Kharkov National University of Radioelectronics. It was presented to the Ministry of Education and Science of Ukraine during several meetings and was supported by Ministry officials. The project application for Portal methodology development has won in the Ukrainian State Fund of Fundamental Research competition. At the current stage the Portal that represents a transparent and effective on-line system for universities' accreditation, licensing and ranking support is under development. The procedures for licensing and accreditation are the basis of university activity regulation mechanism, they are aimed at educational establishments' ranking [2]. The ontology of Ukrainian national scientific-educational resources designed to support the processes of universities' activity evaluation (licensing, accreditation, ranking) has been already developed [3].

3. Portal features

As mentioned above, the Portal is a web-oriented distributed system developed with the use of ontological approach to information systems building. The world-wide network Internet is used for distributed information system organization and therefore provides easy accessibility and reliability of the system.

The standard program Internet Explorer (with coding and information authenticity ensuring mechanisms included) is used as a client application. Such a solution allows easy opening of the system on the client stations, high level of delivered information security, easy updating and centralized management of the distributed system. All information that is delivered from a client to a server will be coded using special libraries included in Internet Explorer. These libraries are used even in bank operations indicating their high reliability.

Target users of the system are Ministry and university staff. When a user enters the

system he/she has to input his/her login and password (authorization process) or to sign up. These data will be delivered to user's authentication mechanism responsible for the access rights delimitation and to audit mechanism responsible for logging of all users operations with indication of time and connecting parameters.

The Portal provides such opportunities for resource management as reviewing, editing and adding of new educational resource. These functions are provided according to a user's rights.

The handy tools for navigation through university structural entities (faculty, department, specialty and group) are provided to the user during the request creation. Selected from the list characteristics such as teaching staff, students' contingent, teaching and material resources etc. can be shown for each of structural entities.

User can select the university, department or other structural entity from the list or find by its characteristics, view common information (e.g. address, telephone, name of Department Head, etc.) and common characteristics (e.g. for university: number of licensed specialities, number of students of different teaching types, etc.).

Usage of ontological approach allows resolving a number of technical problems concerned with modification of educational documentation structure without system transformation. Since 2007 new accreditation criteria are introduced in Ukraine. As a result it will be enough to modify only the ontology which is the basis of the system. In addition, ontology parameters modernization is done in a visual mode saving of all information contained in this ontology.

Web-oriented approach allows providing of multiple users mode, which works in distributed environment in real time. In order to use the system it will be enough to have only computer connected to the Internet.

Ontological system allows the automatic calculation of activity parameters of department, faculty and university on the basis of facts that have been set by university administrative staff according to formulas and rules which are included in the ontology and can be easily edited using visual interface. It will simplify the document transaction, increase the data actuality and decrease the amount of mistakes in different reports.

Audit system allows reviewing of all users operations during the certain time period in order to find possible mistakes.

Document forming system allows automating the document transaction and obtaining necessary report documentation. After providing any changes to document form they will be accessible for all users at once.

Ontological structure of the Portal allows handy navigation through information content of the system by receiving the links to logically related data. Also it allows semantic search of relevant information.

Conclusions

The idea of Portal creation was motivated by the necessity of modernization of the higher education system according to the European requirements in the scope of Bologna process. Resolving many extremely important problems appearing before the Ukrainian Ministry of Education and Science will be possible due to the information ontological Portal. One of such problems is development of an accessible, transparent system for university accreditation on the basis of organizational, human, informational, material and technical resources quality evaluation.

The Portal will represent a flexible protected web-oriented system for scientific-educational resource management and evaluation. Such a system will allow the quick obtaining of current and correct information about any educational and scientific resource in on-line mode. The ontological approach provides a convenient system for information navigating, integration and coherence. Due to visualization of semantic data representation the verification process of evaluated educational parameters according to accreditation criteria becomes easier.

References:

1. W3C Consortium Portal [http://www.w3.org]
2. Andrusenko S., Domnich V. Accreditation. Organization and realization in academies in Ukraine. – Kiev: KUETT. – 2003.
3. Vitko A., Volkova V., Koreyko N., Sasunov S. Ontology-Based University Resource Management to Support the Accreditation and Licensing Procedures // Eastern-European Journal of Enterprise Technologies, № 5/2(23), 2006, pp. 95-98.
4. Terziyan V., Katasonov A., Global Understanding Environment: Applying Semantic Web to Industrial Automation, In: J. Cardoso, M. Hepp, M. Lytras (eds.), Real-world Applications of Semantic Web Technology and Ontologies, Springer, 2007, 31 pp. (Book chapter, submitted 23 October 2006).

USING COMPUTERS AND INTERNET TECHNOLOGIES IN THE DEVELOPMENT AND CORRECTIONAL WORK OF THE PSYCHOLOGIST

Marina Narovlyanskaya
G.S. Kostyuk Institute of Psychology
Ukrainian Academy of Psychology
Kyiv, Ukraine

At the modern stage of development of society and education, in particular, in the conditions of rapidly enlarging informational streams the ability of an individual, especially a pupil or a student, to perceive and to process large amounts of information becomes increasingly significant. Though this requires the following basic conditions: a sufficient level of the corresponding mental processes, first of all, cognitive and regulatory ones, and the individual's abilities and skills in effective information processing. Nurturing the latter ones is, firstly, the teachers' task, while the development, and correction, if needed, of cognitive and regulatory mental processes are in the hands of psychologists. Nowadays there is a psychologist working in almost every school, there are psychological services in the state social services of every district, the number of psychologists, working in hospitals and other medical establishments, is increasing. At the same time the ways and methods of psychologists' work are also changing and developing.

Today the psychologists often apply informational and computer technologies, but the spectra of certain fields and ways of computer employment depend on both technical capacities and the psychologist's and his client's computer skills. Almost every contemporary psychologist uses a computer in his or her organizational and methodical work in order to prepare various data, plans, accounts, stimulating materials, blanks etc. Computer employment is effective in the sphere of diagnostics results processing, their mathematical processing and visualization. There are possibilities for using computer technologies to gain access to special information, published on a CD or placed in the Internet. At the same time, the employment of computer technologies in the direct work with clients is rather one-sided. There are a lot of computerized diagnostics psychological methods, which significantly differ by their form and level (ranging from amateur cognitive and entertaining to professional). Meanwhile, in our opinion, computer technologies may be employed in the psychologist's correctional and developing activities as well, especially in the field of cognitive and regulatory processes. But the number of computer programs that could be used in such way is much smaller.

In the terms of the given research we are mainly interested in the possibilities of applying special computer programs aimed at development and correction of cognitive mental processes, and whether these programs may be used in distant learning.

The analysis of special literature and software, available in Russia and Ukraine, has shown, that the first software, addressed to young children, has been developed since the 1980s, when the personal computers began spreading all over the world. Today there are the huge number of programs, which, according to their creators, are addressed to various target groups – from pre-school aged children to adults. For example, there are developing games created by "Nikita" company (Russia), "Computer simulator SUPERATTENTION" made by MultiSoft company (Russia), computer game methodic "Build the Dam" developed by G.V. Chayka (Ukraine) and others. Most of such programs are created in the form of games or simulators. There are certain attempts of placing such software in the Internet sites with free access.

At the same time, there are no means of planning and controlling the user's activities and adjusting the program according to the needs of a certain client, so this software may not be considered to be the psychologist's professional tool. These programs, as we see it, may be considered as educational and entertaining programs and additional utilities in correctional and developing work of teachers, psychologists and parents.

Despite the fact that most of such specialized software packages are created by professional teachers and programmers, but not psychologists, it should be said that a number of psychologists studied the possibilities of using these programs in the psychologists' professional work. For example, Yermakov (Ukraine) studied the possibilities of using psychological tests and programs, placed in the Internet, and the perspectives of their application in sports; Kulikova (Russia) studied the influence of educational and developing games upon children; Tatarinceva (Russia) studied the possibilities and the efficiency of computer developing programs employment among younger school students; Thorzhevskaya (Russia) studied the usage of computer developing programs in the work with children suffering from the retarded mental development and hearing problems. Though these researchers have studied the usage of the already existing software, which, as was noted above, does not always provide targeted correction.

At the same time, the modern level of informational technologies' development gives an opportunity to elaborate and to implement software for the psychologist's professional correctional and developing work. That is why in 2004-2007 we created a software complex, aimed at development and correction of attention and randomness. This complex is a professional psychological tool.

The reasons for choosing the above mentioned processes are the following. Firstly, due to the change in the primary school age – it is now 6 years instead of 7, there's an increase of the number of children who require psychological help because of insufficient attention and randomness development. It is subsequent to the fact that these processes are developing rapidly at the age of 6-7 years, so many children, who are developing according to their age and come to the age 6, have to go to school without having their attention and randomness development level sufficient enough for successful learning. On the other hand, the teachers are often not ready to respond adequately to this natural age problem and to correct the kinds of educational work in time. The children with insufficient attention are more often subject to the adults' negative attention, have much more problems with learning, which results in the forming of a lowered self-esteem, and then leads to disorder in forming of personality. Moreover, even among elder people (high school and university students) there is a group of those who have insufficient attention. Its correction could raise their success rate in learning and, in the future, working activities. Thus the problem of attention correction is quite widely-spread and up-to-date. Secondly, when speaking about the issues of attention correction mechanisms we should note, that an effective correctional and development work in this field must be carried out regularly not less than 5 times a week during not less than two or three months' period. However the duration of one class may be rather short (from 5 to 15 minutes, according to the age and the set objectives). But in practice the chances that a psychologist will be able to work with one client or one group on the daily basis (5 times a week) during a long period of time are very weak. So in order to provide the needed correctional effect psychologists are forced to give home work, which is made by the client on his or her own. However, in this case there is a problem of controlling whether the exercise is done correctly and whether the instructions are followed. At the same time using a computer for this reason may provide conditions for exact planning, dosage and instruction observance, as well as for the control over the exercise completion and the correctional and development processes monitoring.

In order to execute the above mentioned functions and to provide maximum individualization of the work with each client we have worked out a general structure of the software complex (see Scheme 1).

Scheme 1. General structure of the software complex.

As shown in the scheme, the complex consists of a diagnostics and correctional and development modules, which are subject to the client's work, a planning and analysis (managing) module that is used by the psychologist to set up an individual correctional and development program for each client, to adjust the client's module programs and to control the whole correctional and development process, and a data base which is a storage for all the information concerning each client's work with the software complex.

During the first stage it was decided to focus on elaboration of the first client's module – the correctional and development one, and to begin working out the diagnostics module after the approbation of the first client's module. While working on the contents of the correctional and development part we have created the contents structure of the correctional and development software complex (see Scheme 2).

Scheme 2. Contents structure of the correctional and development software complex

The scheme shows that the software complex contains two interface elements: the psychologist's interface and the client's interface, through which the users personally contact the psycho-correctional methodical programs. Such approach gives both the psychologist and the client an opportunity to work regardless on their computing skills. All technical processes of interaction between different elements of the program complex are carried out in an accessible and visualized mode. At the same time the interfaces help to divide the levels of access to information, stored in the data base, to carry out the analysis of the correctional and development process and to monitor the efficiency of correctional effect. The battery of psycho-correctional methods consisting of eight programs, each of which represents one or several methods, occupies the central spot in the complex structure. The methods used in the battery combine popular methods of attention and randomness level correction, that we've adapted to the computerized use, and author's elaborations. The computer programs that form the battery and their aims are enlisted in Table 1.

Every program in the battery consists of three blocks: the exercise module that is done by the client, the configuration block and the results review block, using which the psychologist accurately adjusts and individualizes the correctional methods according to the certain client's needs and analyses the work done by the client. All the interactions between the blocks are carried out through the interface. At the same time due to the configuration block we have an opportunity to use the same computer program, but with different configuration settings, for the correction of different elements of mental processes, and to adapt it to the age and individual requirements of different clients.

Table 1. Contents of computer programs that form the battery of psycho-correctional methods

Program name	Method name	Aim
Hunting	Correctional try-out	Attention steadiness, distribution and switching
Find the number	Schulte tables	Attention distribution and switching
The maze	Mazes, mixed lines	Attention steadiness
Count it	Objects counting	Attention distribution
Coding	Word forming	Attention distribution
Secret code	Coding	Attention distribution and switching
Counting race	Krepelin's counting	Attention steadiness and switching, mental industriousness
Superfluous number	Y. Gilbuch's method	Attention steadiness

In general the psychologist's correctional and development work with the client using the said software complex is carried out in the following way:

1. once a week the psychologist uses the interface to create an individual task for the client, the tasks are saved in the data base for the client's further use through interface. In the case of the client's distant work, the needed memory fragment is

copied to a portable information device (flash-memory, CD) or sent to the client's e-mail.

2. the client uses the interface to complete the tasks (5-20 minutes 5-6 times a week). The data concerning the completed tasks and the results is saved in the data base. In the case of the client's distant work, once a week the needed data base fragment is copied to a portable information device (flash-memory, CD) or sent to the psychologist's e-mail.
3. once a week the psychologist analyses the completed tasks information and moves on to point 1 and creates the task for the following or next week.

Today we have completed and started probating the correctional and development programs of the client's module and the basic elements of the managing module at Kyiv school #318 and in the charitable organization "Beiteinu – Our Home". In this case the data exchange between the client's and the managing modules is conducted by means of local network or via flash memory and e-mail.

In general the use of the developed software product provides an opportunity to carry out a purposeful individual psychological correction of attention and randomness development accompanied by a clear dosage of correctional material and the development process constant monitoring during long periods of time. At the same time the use of the software complex gives a chance to vary the stimulating material in order to prevent the client from getting accustomed and to raise the bar of client's interest, and, in some cases, to enforce the motivation due to a non-typical form.

In the future we are planning to continue working on this software complex. We hope to carry out an experiment on its use in different circumstances and to conduct a validation of the computerized variant of certain methods in order to implement them in the diagnostics module. After the end of probation it is possible that we will adapt the software complex to the server variant and place it in the internet.

eLEARNING AT UNIVERSITIES: INFRASTRUCTURES, SERVICES AND SKILLS – AN EXAMPLE: LEIBNIZ UNIVERSITÄT HANNOVER (LUH)

Anne May
University of Hannover library
Hannover, Germany

1. Introduction

In the course of this Keynote Lecture, I will be using the Leibniz Universität Hannover (LUH) as an example of how a project and its associated activities can mutually affect the introduction of a coordinated information management process. And sure - what responsibilities the library has in this regard. I will also be looking at how support is provided to develop teaching staff's skills. The deployment and utilisation of new media is increasingly seen as an integral part of studying, teaching and research and a fundamental aspect of a university's competitiveness. This assessment primarily stems from the requirements of the developing knowledge society and the associated need for lifelong learning. Universities are being called upon to adapt their teaching to ensure these requirements are met.

Furthermore, the use of eLearning in university teaching is fundamentally linked to the hope of being able to achieve innovations in education. Information and communication technologies can be used to introduce innovative methods of teaching and learning, new contents, and new ways of organising courses, as well as to influence the transformation of teaching and learning cultures. Further potential lies in the individualisation and self-organisation of learning processes. Learners are able to tailor the selection of objectives and contents to meet their own needs in the form of autonomous learning and phases of direct, interactive teaching/learning exchanges. In this context, eLearning must either be at least as effective and efficient as former teaching variants or demonstrate new features if it is to be accepted and utilised in educational establishments and universities in the long term.

So just how accepted is eLearning among those actually involved in offering eLearning components in their courses, namely among teaching staff? What are the challenges facing eLearning in the opinion of teaching staff?

An analysis conducted at the LUH in 2005 produced the following results:

- There is no authoritative definition of the term eLearning: for example, does eLearning encompass something as simple as placing lecture notes on the institute's homepage?
- Less than half of the institutes use any form of eLearning.
- Learning platforms, authoring tools, standards and services currently still play a subordinate role.
- There is likely to be considerable resistance to the introduction of eLearning in certain cases.

In other words, it is still necessary to boost motivation, skills and the willingness to act among teaching staff. To ensure that any investments result in eLearning being permanently established, it is crucial that all measures to develop infrastructures and services are oriented towards developing the skills of the people involved in carrying out the university's eLearning programme, namely the teaching staff. This starts right from the stage of organising a co-ordinated IT infrastructure and setting up the services and information.

2. Initial Situation

Typical initial experiences with eLearning and eLearning services from teaching staff's point of view are outlined in the following case studies, which could and probably still can be encountered at almost any college or university. I have taken them from a handbook on the topic of eLearning[1]. Maybe you remember a similar situation in your own experiences:

Professor Brown

At an international conference, Professor Brown, an eminent sociologist, attends a lecture given by a colleague from the USA regarding a seminar dealing with "Intercultural Communication". The seminar was implemented across the university with the help of computers. Since he also offers courses in this field, he is considering whether, and how, he could introduce this kind of seminar at his university.

He instructs a student assistant to investigate the available options in the computer centre. The student discovers that the university has a variety of tools for this purpose. She draws up a list of possible solutions.

Among other items, this list contains the following keywords: videoconference technologies (packet-switched or circuit-switched), virtual classroom, asynchronous variants based on forum technology, groupware solutions or solutions based on learning platforms or content management systems. In addition, a postgraduate contact informs the student of entirely new approaches, in which XML is used as a basis for implementing standardised learning objects, which can be reused multiple times.

Professor Brown is horrified. He never imagined it would be so complicated. He 'simply' wanted to run a seminar with international participation, like his colleague from Pittsburgh. Professor Brown is uncertain what to do: would it be better to just forget about his project?

He knows that he has minimal experience with these technologies. He has no problem composing documents on his computer, checking his e-mails and using the Internet, but he can sense that he is pushing his boundaries. Professor Brown is unsure of himself: would he be able to acquire a reasonable grasp of this new field? Will he appear weak to others if he admits to his lack of skills in this area? Is it better to get involved in the topic as soon as possible or to just wait and see what happens? Will all his colleagues soon be following the American example? Is it worth the effort of familiarising himself with this subject? And what support can he expect to receive? For now, Professor Brown decides to wait and see.

Or do you recognize the following case?

Anna in search of a solution

Anna, a research associate in the Psychology Department, has read about new methods that can be used to conduct psychological experiments and laboratory trials in a virtual laboratory. She would like to utilise this as part of the course she is giving, and a search on the Internet soon locates the supplier of the software "Psycho-Lab", which she is able to download and install for free.

When she calls the user hotline of the computer centre, she is referred to the eLearning department, which is responsible for activating accounts for lecturers and setting up courses on the university's learning platform. Anna explains what she is trying to do.

The eLearning department sets up a course for her on the learning platform, but informs her that it cannot provide any help in setting up and incorporating the laboratory environment in the learning platform. Anna is confused by this, and she is advised to take a course on the learning platform offered by the eLearning department.

By chance, she falls into conversation with someone who works at the media centre. He explains that the software is ASP-based and cannot actually be integrated in the learning platform anyway. In addition, she discovers that the computer centre has decided for political reasons not to run any servers with a Microsoft operating system.

Anna finds this very frustrating and pulls out of the course.

She explains the situation to Maria, who occupies a neighbouring office, and who is known as a computer expert. It takes her just a few minutes to set up the Psycho-Lab on a server that she rents from an external host at very little cost.

Anna is impressed, but she is also annoyed by what she has experienced at the university.

Unclear responsibilities, fragmented services that teaching staff have to piece together themselves, and cumbersome procedures frighten off lecturers that have no experience with eLearning and cause more technologically-savvy people to turn away from the service providers in frustration. What can be done to change this? How should services be implemented if they are to promote innovation, support skills development and create benefits? How should we persuade teaching staff to exploit technical innovations? This is an issue that received little attention in the early, more technically oriented projects, yet which is central to establishing eLearning in a sustainable fashion. In common with almost all universities, the initial development of eLearning programmes at Leibniz Universität Hannover was left to individual stakeholders and projects run in the faculties.

At LUH, too, the topic of eLearning was characterised, up until recently, by a multitude of successful individual projects, which relate to individual institutes, isolated portions of courses or individual lectures. These projects tended to focus on the creation of electronic learning media. However, links between the numerous activities and protagonists were minimal. For the university's teaching staff, (only a fraction of whom actively employ eLearning elements in their current teaching), the result was a thoroughly unsatisfactory situation, as clearly illustrated by the case studies.

Eventually, large-scale development and funding schemes for eLearning[2] came into play (such as the eLearning Academic Network project in Lower Saxony that finished at the end of 2006 or the "Neue Medien in der Bildung" (New Media in Education) development scheme run by the German Federal Ministry of Education and Research). It was only at this point that discussions began on how to safeguard the sustainability of the corresponding initiatives and investments. These programmes prompted a change of thinking in German universities, a change that was necessary to create reliable infrastructures to establish eLearning in a sustainable manner.

Projects were only accepted if university management teams were able to demonstrate both - management accountability and broad participation of users and suppliers in their project applications. And if they guaranteed to use their own funds to maintain the eLearning infrastructures and services supported by the project funding and clarified this appropriately in their project proposal.

This change was necessary to focus on the key, critical success factors for sustainably anchoring eLearning innovations in universities, which are based round the following three requirements:

- Sound organisational infrastructures and secure technical infrastructures
- Demand-oriented services with a "single point of information"
- Skills development for teaching staff as the "gatekeepers" of eLearning innovations

In my university a significant step to this focus was taken through the HannoverELearningCampus ("HELCA") project, which was funded within the scope of the "Neue Medien in der Bildung" (New Media in Education) development scheme. The aim of this project, which is scheduled to run until 2008, is to develop sustainability strategies to maintain eLearning, as well as to establish and integrate personnel and WWW-based services.

The intention is to promote and permanently implement the development of organisational and sustainability strategies using the following key measures:

- Establishing a comprehensive information management system
- Establishing an eLearning support department ("ELSA")
- Developing incentive and marketing models
- Quality management

In the following sections I will explain the steps we took.

3. Establishing a comprehensive information management system (CIO structures)

In Hannover, the HELCA project is of primary importance in our efforts to set up organisational and technical infrastructures. In my opinion, the HELCA project also helped

everybody at LUH to understand the necessity of coordinated control and overall planning of the IT infrastructures. This increased the urgency to act, which was already discernible for other reasons. In the summer of 2006, experts were commissioned to develop a conceptual design for a newly-structured IT service infrastructure for LUH. The team entrusted with this task included representatives from among faculty users of the services (teaching staff and students) as well as the CIO, who had recently been appointed, and the main suppliers of IT services (the computer centre, the library, and the administration's information and communications department). The team began by developing strategic guiding principles as a means of orienting the IT activities at LUH. The key points for the topic of eLearning were found to be as follows:

We wish to develop an IT infrastructure, which, in accordance with the strategic objectives of Leibniz Universität Hannover, supports and promotes research, teaching and further education and adapts to new requirements in line with the principles of a learning organisation. This IT infrastructure will enable us to meet the challenges involved in creating an attractive, competitive and innovative university. These include:

- New bachelor's and master's degree structures (BAMA)
- Increased competition between universities
- More economical handling of resources (people, finances, facilities)
- Utilisation of the new means of communication of the knowledge society (eScience and eLearning)

We shall develop a service-based IT infrastructure from the perspective of our customers. Our customers are:

- Academics and scientists
- Students
- Institute and administration staff
- External customers (graduates, students switching university places, interested academics, sponsors, companies, cooperation partners)
- The public outside the university sphere

We shall create a central, consolidated IT service provision that includes decentralised expertise.

We shall create a structure for communication, decision-making and organisation, which satisfies both the requirements of customers and the options available to service providers, incorporating the following elements:

- CIO decision-making and consulting structure in the form of a service provider/user forum
- Efficient, operational IT service organisation ("from a single source")
- Ongoing, comprehensive and independent quality assurance

We shall create a transparent change management system incorporating the following elements:

- Taking stock (services, processes, service architecture)
- Migration plan (phases)
- Instruments for planning, control and monitoring of IT measures
- Information and training measures (IT by the people, for the people)

Based on the strategic guiding principles, the following recommendations for implementation have now been issued by the Executive Council:

- Introduction of an IT governance structure
- Implementation of planning processes (service portfolio, IT road map) to regularly check and adjust the IT structures
- Formation of a three-tiered IT service infrastructure with (1) an IT help and service desk, (2) application-specific support groups, and (3) a central IT base service (network, security and operating services); and
- Introduction of a quality assurance process for IT services

The planning and consulting/advisory structures are shown in the following illustration:

Figure: Planning and advisory/consulting structures (IT governance)

The position of CIO and the CIO Office were created as central points of coordination. The CIO plans and monitors IT activities of a general nature at LUH. They seek a balance between customer requirements and the options available to the operating units. They develop the LUH's IT strategy and propose implementation measures to the Executive Council for their approval. The CIO is supported in this task by the following bodies:

- the Information Technology Advisory Committee (Beirat für Informationstechnik (BIT)) as a provider/user forum. Its tasks include IT planning, monitoring, and resource allocation.
- the Faculty Information Officers (FIOs) as the spokespeople and interfaces of each faculty. As you can see, this already incorporates the user perspective. Additionally, this perspective is incorporated through the
- competence teams, which are either function-oriented ad hoc teams working on current issues or permanently established institutions.

As shown in the next illustration, the Operating Structure needs to be heavily oriented towards the customers.

Figure: Operating Structure

The operating units are responsible for implementation of IT measures, service and customer support. The idea is to largely maintain the existing operating units, such as the RRZN (Regional Computer Centre for Lower Saxony), CCC and TIB/UB, but to integrate them in a general, three-tier IT service infrastructure oriented towards the customer (Fig. 5).

A key feature of this infrastructure is the implementation of a new general quality assurance system for IT services. The IT service infrastructure consists of the following levels:

- Application-neutral IT base services
- Application support by support groups
- IT help and service deskWe are currently engaged in planning concrete measures.

Seen in relation to eLearning, we therefore have a situation at LUH where an organisational basis has been created to allow sustainable implementation of the infrastructures and services required for eLearning. The perspective of the people involved in carrying out eLearning, i.e. the teaching staff, has been taken into consideration from the beginning.

But back to the Hannover Elearning Project.

4. eLearning Service Agency

The eLearning Service Agency (or ELSA) was initiated in 2005, even before the CIO structures were implemented. ELSA was assembled from members of the HELCA project (Hannover eLearning Campus) and the ELAN project (ELearningAcademicNetwork, a pan-university project run by the Federal State of Lower Saxony).

The HELCA project runs until July 2008 and has the goal of establishing ELSA as a "single point of information" at LUH. Funding for the eight staff members is currently provided by the German Federal Ministry of Education and Research. On the LUH side, the L3S research centre, the RRZN, the TIB/UB and some faculty institutes are all involved in both projects. Let me introduce the main operating units:

- L3S: The research centre for new, innovative methods and technologies in the key areas of knowledge, information and learning, is involved in the ELAN and HELCA projects as a partner and has built up extensive experience in the field of eLearning over the last few years. In addition, it provides both staff and technical resources to

support eLearning. Assistance from the L3S research centre is, however, limited to the duration of the HELCA project. The L3S is not oriented towards permanent operation of an service provider like ELSA since it primarily pursues the goal of excellence research.

- RRZN: The RRZN (Regional Computer Centre for Lower Saxony) operates powerful servers and the LUH's communications network. The student helpdesk in the RRZN supports students who have questions about student servers and wireless LAN access. Recently, the RRZN also started handling support and registration for the Stud.IP learning management system.
- TIB/UB: The TIB/UB (German National Library of Science and Technology/University Library Hannover) is a partner in the HELCA project in the fields of referencing and archiving. Digital learning objects are made available through the library catalogue. A metadata model was developed in the ELAN project (ELAN Application Profile) and selected library search and provisioning services were incorporated in Campus Management within the scope of the HELCA project. I will show you some more details later on.

The ELSA provides a range of services within the context of the HELCA project. The following service capabilities are currently offered:

- Central coordination of eLearning services: ELSA management provides a contact partner for eLearning, who coordinates operation, support, information events, consulting sessions and training, monitors developments in the eLearning market and introduces new solutions where applicable. The Head of the ELSA is also responsible for contact with eLearning coordinators, strategic consulting groups and university management.
- Training, consulting, information and evaluation: In order to promote an implementation of eLearning at LUH that is both fruitful and comprehensive, the ELSA regularly conducts training on teaching and learning using learning technologies. In addition, the ELSA offers teaching staff consulting services to advise them on concrete deployments of eLearning scenarios in their teaching and organises information events to assess the possible deployment of eLearning in colleges/institutes.
- Technical operation: The ELSA is responsible for operating the centrally run Stud.IP and ILIAS systems. In close coordination with the training and support areas, these systems are provided as a baseline service for all the university's courses.
- Support for deployment of media technologies: The ELSA is also responsible for providing advice on procuring, operating and maintaining media technologies in classrooms and other teaching spaces. In addition, it ensures proper operation of specialised services for media provision (streaming servers, archiving). On top of this, case-specific recordings can be made by the ELSA for teaching staff or institutes, who do not possess their own media technologies.
- Help-desk: The ELSA coordinates the eLearning support provided by helpdesk staff in the computer centre and student assistants. Queries on the subject of eLearning are forwarded to appropriate experts from the above-mentioned areas.

Figure: Planned service Scope

The following learning technologies are already in operation and available for use:

Multimedia technologies

- Over the last few years, a number of classrooms have been equipped with simple technologies (e.g. video beamers) and more complex technologies (e.g. cameras, 3D projection, electronic white boards and videoconference technologies), which support a variety of eLearning scenarios.
- Within the scope of the HELCA project, the prototype of an interactive eclassroom was implemented, in which both the teacher and the students are equipped with computer workstations.
- A central streaming server is operated in the computer centre, which supplies videos in Real and Windows Media formats.
- Multimedia learning materials can also be created with technical support from the computer centre, to the extent that staff capacities permit this. This primarily involves audio and video recordings.
- For video conferences, the computer centre provides a number of appropriately equipped rooms of varying capacities. Remote lectures with local attendance are also possible in these rooms.
- Two rooms equipped with high-level media technologies are available in L3S, which provide support for complex learning situations such as video conferencing using multiple cameras, recordings of conversations using table microphones and 3D visualisation.

Authoring tools

- The RRZN and the L3S provide authoring tools to interested parties and, in collaboration with the ELSA, offer training and services for their deployment in teaching.

Learning management and learning content management systems

Two closely coordinated systems are provided at LUH to support studying and teaching.

- Stud.IP: The learning management system Stud.IP has been in test operation since October 2003. Following a successful test phase, Stud.IP has been deployed in almost all the institutes and in a majority of the courses in the Philosophy and Architecture and Landscape faculties since the end of 2005. A number of other individual institutes and lecturers also use the platform for their courses. Users from more than 50 of the institutes at LUH are now registered in Stud.IP.
- Since the 2006 summer semester, data on courses, facilities, people, facility structures and syllabuses are regularly imported from the HIS-LSF system, which centrally manages all the courses. Users already registered in the system and students that have access to the student server can activate access to Stud.IP themselves. Stud.IP is therefore available for university-wide pilot operation and is intended to be established as a permanent service.
- ILIAS: The learning content management system ILIAS provides support for carrying out multi-stage online examination procedures, virtual courses and exercises.

And what does the library offer in this context?

Referencing and archiving

It can be hard to maintain an overview of the available resources with such a steady increase in the amount of learning software, lecture recordings and electronic documents. Proper referencing, cataloguing and archiving is therefore essential. This also enables targeted searching of the stocks of electronic learning objects, which facilitates self-driven learning (e.g. within the scope of project work). As part of the ELAN project, the TIB/UB experimented with the DSpace document management system. Courses and other contents are centrally referenced and archived via DSpace and integrated in the OPAC. Further work is needed in this area on technical and workflow-related issues to transfer the regional ELAN-solutions in local concepts.

Cross-linking LMS and literature searches

In the HELCA project, we developed cross-linking between learning management systems and information searches. The aim was to offer a smooth navigating environment and to initiate literature searches from within the LMS. Direct searches facilitate on-line access to electronic resources and full texts and further processing of the resources in the context of the learning environment. Since we do not yet have a single sign-on solution at LUH, double authentication is currently still required (LMS login and information search login). Currently, a simple literature search is integrated in the LMS, which initiates searches in the university library catalogue and some other central catalogues. The next step is to integrate a subject-based metasearch, starting with an Economics subject cluster.

Course-specific provision of electronic documents

Additionally, we are developing a workflow for the course-specific provision of literature and information as background support material for eLearning courses. The aim is to initiate and manage the workflow via the LMS, beginning with the order by the lecturer and encompassing release for the course participants and scanning of the materials that are primarily available in print. This enables digital media to be directly inserted and utilised in the students' and teacher's work processes.

The services offered are also having an indirect impact on expanding media competencies, such as finding, reading and searching in hypertexts and processing them for in-house publications.

Online Information Literacy tutorial

A direct contribution to enhancing skills was made in the HELCA project through the development of an online Information Literacy tutorial. The aim of the project was to develop a subject-linked electronic service to impart skills based on the Information Literacy Standards for Higher Education, which could then be transferred to other subject areas and employed within the scope of blended learning. The module was therefore incorporated in a standard lecture and recorded as a video. The learning materials were made available in the LMS for reinforcement and follow-up use in the form of lecture slides, summaries and an online quiz. The module is referenced in the library catalogue. Internally, the project work has facilitated further development of the former training programme into a modular training programme. In turn, this enhanced the university's discussions on the profiling of key competencies.

That sums up the current situation: so what's next?

5. Looking to the future

Further transitioning of the contents and organisational aspects of the project tasks into the university's day-to-day operations is currently dependent on the following issues, which are being processed within the scope of the new CIO structures:

- Approval of an eLearning strategy for the university
  A LUH eLearning strategy was developed in the course of the HELCA project. This is currently in draft form and must be agreed with the university management and executive board.
- Transition of ELSA duties into a permanent service
  One point that requires clarification here is how the duties are classified in the three-tier service infrastructure presented at the start of this document (e.g. as an independent service agency in the Campus Management area of control). In my opinion, this requires us to take a stance on the question I mentioned earlier, namely: how can support and consulting services make the best possible contribution to

enhancing skills, in the sense of having a positive effect on the teaching staff's motivation and willingness to act?

- Referencing and archiving of eLearning models
  It is essential that the library facilitates permanent access to the teaching/learning materials on the basis of a referencing and archiving concept that is still to be agreed at LUH. Decisions are still pending on the archiving systems and workflow, and also on retention periods and accessibility of materials; these must be clarified in the CIO context. General concepts for efficient storage of and access to teaching and learning units and their indexes developed in the ELAN project must be converted into local concepts.
- Development of incentive and marketing models
  Although initial ideas have been collected on this topic, no concept has yet been finalised (e.g. internal sponsorship and development schemes, recordings for good eTeaching, paying attention to eLearning activities when setting agreements on objectives and performance).
  To achieve the comprehensive introduction of eLearning in university teaching, an innovation model is under discussion, which recommends "promoters" for the implementation of an innovation, in this case eLearning.
  Promoters are people who actively and intensively promote a process of innovation or change. Their main task is to dismantle and overcome barriers confronted by staff in terms of their will and ability to deal with innovation processes in an institution.

So much about our situation at LUH.

As you have seen, an organisational basis has been created to allow sustainable implementation of the infrastructures and services required for eLearning. The perspective of the people involved in carrying out eLearning, i.e. the teaching staff, has been taken into consideration from the beginning of the implementation of CIOstruktures and at the transition of the central eLearning Project tasks and services, which is in progress. All in all a typical middle-rate situation relating to eLearning, I guess. Not yet excellent in this field, but even not bad. Typical enough to sum up some general conclusions:

6. Summary

If a university genuinely wishes to exploit the potential of eLearning to improve its teaching, it must systematically think through the measures required to achieve its stated objectives.

The skills of the teaching staff must be understood as the key element in developing measures to establish infrastructures and services.

The teaching staff will only be prepared to apply eLearning-based teaching methods if they are convinced of the logic and added value of such an approach.

Students will only consider this to be an attractive feature when choosing a university if a broad and top-quality range of services is on offer.

Investment only makes sense if these conditions are met.

The problems depicted in the case studies at the beginning of my speech are still all too familiar at many universities.

In my opinion, however, they do at least enable us to derive some essential requirements for setting up the relevant services and infrastructures:

- Single point of information
  A person should be able to find all the relevant information in a single location. It should be structured by services and not by department or responsibilities. The staff working in the service departments must know where each service is available in order to provide specific advice. It is not the customer's job to know this. The sources of information provided by the individual departments should not be competing for attention, but rather generating common interest in a topic.

The service processes are organised in a way that ensures that customers only have one contact partner and do not have to invest time in searching for and combining individual components of the service they require. They are able to select services as "products" that directly relate to their requirements.

- Support and consulting services must be understood as a means of enhancing skills:
  Teaching staff will only utilise a new eLearning-based methodology in their teaching over the long term if they have acquired the necessary skills.
  Technical infrastructures, support and consulting services should therefore be set up from the perspective of enhancing skills and developing staff capabilities.
  It is therefore vital that support and consulting services are not simply reduced to "technical solutions"; instead, it is important to understand that they contribute towards enhancing skills through communicating approaches and 12.06.2007 20 boosting people's willingness to act, and that they should be integrated in the university's personnel development concepts.
- Integrating information events and training in personnel development concepts:
  It is necessary to develop measures that boost practical, social and personal skills in order to produce positive changes in the knowledge, attitudes and skills that relate to the topic.
  It is not sufficient to just teach technical skills; instead, the training programmes need to be designed to make a contribution towards ongoing educational development.

This would create a fundamental basis for developing teaching staff's skills. In combination with a learning-optimised quality development process and binding incentive schemes, eLearning can get an integral part of studying, teaching and research and a surplus value for teaching staff and students.

References:

1 Handbuch der Kompetenzentwicklung für ELearning-Innovationen [Handbook of Skills Development for eLearning Innovations], 2006, Euler, e.a.
2. eLearning strategy of the German Federal Ministry of Education and Research (BMBF) "Neue Medien in der Bildung" [New Media in Education] (2000-2003, 267 million) "Notebook-University" Q(2002-2003, 25 million) eLearning-Dienste für die Wissenschaft [eLearning Services for the Academic Community], 2005-2007, 30 million)

OPEN SOURCE SOFTWARE IN HIGHER EDUCATION

Alex Birchall and Alan Hopkinson
Middlesex University, Learning Resources
London, UK

Abstract
A description of Open Source software is given and reasons are given for its appropriateness in Higher Education. Methodologies are proposed for ensuring its greater take-up in Higher Education – should Higher Education activiely develop in this direction? - and some recommendations are given on how the sector can secure the use of Open Source.

1. What is Open Source?

Since the beginning of the computing era, there has been a proportion of system developers usually looked upon as enthusiasts first and perhaps professionals second who have been keen to develop systems in cooperation with others, usually a very loose form of cooperation. There was the shareware movement where programmers would work on a programme and make it available to the world through various 'networks' which in those days meant providing floppy disks in return for voluntary financial contributions. When the internet appeared on the scene, it all but killed off shareware because it became too easy to distribute this software: no one was prepared any longer to pay for it as it is so easy to download from the internet and the person acquiring the software usually never gets round to the more difficult task of paying for it.

Open Source Software is the successor of this movement in the internet era. There is a worldwide "movement" underway related to open source software development; consequently the term has acquired many different meanings depending on one's perspective.

Strictly speaking, "open source" means that the software source code is:

1) made available for others to use, view, and modify;
   and
2) that it may be redistributed by anyone for free, without royalties or licensing fees to the software owner.

In contrast, source code from purchased software packages generally is not distributed or made fully accessible to anyone and in many cases users are prohibited from copying or redistributing the compiled software.

The term "open source" is however commonly used to denote a particular model of software development. This is the decentralized approach taken by well-known and established projects such as Linux and Apache, in which a world-wide community of programmers contribute to the development and ongoing maintenance of the programs. There is a wide continuum of motives for those who contribute to open source software.

At one end of the spectrum are unpaid volunteers motivated by the intrinsic rewards of solving an interesting problem, by the prestige one can gain within the programming community or the user community, and by the desire to create something for one's own use.

Second, there are programmers assigned to add locally needed features and contribute to the improvement of open source software by organizations that have made a business decision to adopt it.

Thirdly, there are companies that choose to enhance opens source software because they sell services related to that software. This third case includes even companies like IBM, which develops open source software in a centralized, controlled environment. They can earn their living by providing maintenance and other value-added services associated with the software.

The two meanings of 'open source' are difficult to separate completely and are often confused.

2. Why Open Source in Higher Education

2.1 Availability of Programmers

Open Source is attractive to the Higher Education sector (HE) where there are computer programmers available with many more roles than are found in commerce or industry.

There are students who need to do programming projects, academics who want experience, interns in computing centres who are on courses from that or other universities, recent graduates needing more experience before joining the commercial world. So HE is well placed to find the programmers it needs.

2.2 Origins of Open Source Software

Many of the best known commercial products used by HE began in universities. Blackboard, the VLE software, was originally developed by and for the US University of Cornell. Sun Microcomputers Operating System was originally Berkeley's version of UNIX. Cisco's network systems were built on Stanford's networking software. Most library automation systems began in a university and were developed by shared activity. The best example was DOBIS/LIBIS (University of Dortmund with support from IBM on whose minicomputers it ran), DYNIX and VTLS (Virginia Tech Library System) TALIS, formerly BLCMP which was Birmingham Libraries Cooperative Mechanization Project. The UK Heritage system was developed for University College Oxford. Other systems which no longer exist originated in the HE sector and failed later when in the hands of the commercial sector such as LIBERTAS which began as South West Academic Libraries Cooperative Automation project.

In the digital libraries field, Greenstone has been developed by Waikato University and made available through various channels including through the sponsorship of UNESCO. In the repositories field, Southampton University has developed eprints and DSpace, developed jointly by MIT and Hewlett Packard are both Open Source products.

Open Source is not the same as free! Software such as the members of the CDS/ISIS family are not open source. CDS/ISIS for DOS and Windows is freely available but the Source software which developers need to adapt to tailor software to their own needs is not available as much of the software is only available in the compiled version. Software may be made freely available but if the source is not available the software is not Open Source. UNESCO has a policy to foster Open Source software so it is ironic that one of their best known packages is not Open Source and the only way it could be would be if it were rewritten from scratch. BIREME in Brazil are working with UNESCO to produce an Open Source version.

2.3 Current Open Source in Higher Education

Formerly, universities developing software for themselves which they felt had value for others tended to sell it to a company or at least to set up a company at arm's length to support it. Now through Open Source there is a model for cooperative and shared development. To meet the specific needs of HE a number of packages have been developed through Open Source

Over the past ten years software has assumed a critical role in higher education. In the early 1990s students and faculty were just beginning to use email in earnest. Today, software is woven into almost every aspect of HE, from enterprise resource planning systems used to administer universities, to the distributed research efforts faculty routinely engage in, to systems supporting Virtual Learning Environments (VLEs) and online courses used for teaching, to institutional repositories and publishing tools used to disseminate research. Campus networks must support local and remote users, provide a high level of security, and meet a broader array of software needs than most large corporations. These include campus portals, student portfolios, personal information managers, and peer-to-peer file sharing tailored for the academic community. Sophisticated software applications are also playing an increasingly prominent role in some areas of the sciences and social sciences. To meet these demands, many universities have built up large IT departments, and in some cases develop their own software to meet these specific needs.

Over a dozen open source projects have been launched within the higher education community to address many of these needs.

The oldest of these is uPortal, which is a free, sharable portal-enabling software which allows academic institutions to provide abridged and customized versions of their campus Websites. uPortal compares well to commercial alternatives and has been adopted by hundreds of institutions worldwide.

major project underway is Sakai, a community-based software development effort to design, build and deploy a new Collaboration and Learning Environment (CLE) for HE. Sakai is led by staff at the University of Michigan, Indiana University, MIT and Stanford.

2.4 Open Source in the HE Sector

The commercial world has leaders, usually though not always the largest corporations, with the funding to put the necessary resources into providing exactly what the sector needs. The lesser institutions can ride on the backs of those. However programs developed for their administration often are not suitable for use in the academic sector. Human Resource management programs like Peoplesoft are developed for much more structured environments. Oracle Financials similarly.

Open source is increasingly viewed as a viable alternative to proprietary software and is having a substantial impact on the way commercial organizations do business. Linux, the best known Open Source operating system has a 28% share of operating systems on enterprise server computers, and Apache web server software is used by 67% of all websites. MySQL, the best known open source data base management system has over six million active installations worldwide. Major corporations such as IBM, Hewlett-Packard, Sun Microsystems and Intel have become supporters of Linux and hardware suppliers sell machines loaded with Linux software. IBM, Oracle, SAP, BEA, Veritas and Intel, as well as many smaller firms such as Red Hat, have created programming groups assigned to work on open source software and provide support services.

There is also enormous interest worldwide among developers. The SourceForge.net website lists over 100,000 open source projects in progress covering almost every kind of software and has more than 1.1 million registered users.

Many people have been suspicious of Open Source. Shirish Netke of Aztec Software writing in sandhill.com a website for software executives about business strategy reminds us that "open source is not about free software. It is really about a new business model for software services." [1]

This is becoming an increasingly widely shared opinion in the software development industry.

Something which like shareware began as something done by and for enthusiasts has taken off commercially. Why has this happened? It must be that unlike shareware it offers a sustainable business model.

Additionally, open source software can offer greater flexibility for the user. Users can choose to avoid becoming locked in to software provided by a particular vendor, they are not compelled to upgrade to the same extent. Vendors who support open source software have an incentive to offer a better service because switching costs for customers are much lower than with proprietary software. Open source code can be customized by users, and improvements can be shared among the user community. Users can choose the features that are important for their own institutions. And open source code is usually based on open standards that foster integration and interoperability. An indirect benefit for users is that, where a credible open source alternative exists, they may gain leverage in negotiations with vendors and can put pressure on them to provide greater flexibility and transparency.

Of course one must not forget that there can be disadvantages in the open source model.

First, since the software itself is distributed for free, funding may not be available to support all the features users want when they want them. But this is true of formally purchased commercial systems.

Second, as most early successful open source software has been developed by technical people for technical people; these projects (particularly those following the community development model) did not tend to invite the user-centric design approach that is desirable for end-user applications, although it must be pointed out that recent new open source applications such as Firefox (an internet browser) appear to be overcoming this hurdle.

Finally, there is often no legal entity responsible for indemnifying users, who may be exposed to copyright infringement lawsuits. The fact that an established company such as Lloyd's of London is about to launch an open source insurance product shows that this risk is a cause of concern for many – and also illustrates how mainstream this movement has become.

Does Open Source save money? In certain areas it certainly does. Apache is free and causes very few problems. Firefox is a free web client and that can be installed and causes few problems. If there are problems there is a community of people out there ready and willing to help. Of course no one has to use Firefox and its alternative, Microsoft's Internet Explorer is available to everyone who has obtained Microsoft's Operating System. However in the future some of these OS products may cease to be developed and users would have to return to Firefox. However, any product, commercial or OS has a risk of being discontinued, even if the product is successful. This happened recently in the case of the Horizon software which we have at Middlesex University.

3 Should higher education develop open source software to meet its own needs?

Champions of using open source in HE say that academic institutions have unique needs that are not well served by commercial vendors because the sector is too small to support a robust competitive market. Higher education accounts for a relatively small share of the IT industry.

The relatively small size of this market does not attract the level of competition some would like to see in areas of interest to higher education institutions such as VLEs and financial systems targeted to the community.

As a result, one of the most often-heard complaints is that available software options do not have the features required or do not allow for cost-effective customization. In the library field, the three or four options for integrated library systems, all of which are proprietary, are expensive, contain bugs, developments are slow, and in general they do not allow customers to tailor them to their own specific needs. Additionally they are not that popular with users. As far as open source alternatives are concerned there are Koha, Emilda and Evergreen. Evergreen is in use in largish libraries but does not have acquisitions; Emilda is a new package produced in Finland and Koha has only been used by a very few academic libraries worldwide. Certainly the community could if it developed its own software put pressure on commercial vendors to make their products more open, more flexible and more easily adaptable.

Another common concern of many administrators these days is that academic institutions are too much in the hands of commercial vendors. The acquisition of PeopleSoft by Oracle in late 2004 is probably the most noteworthy example. After spending huge sums installing PeopleSoft, many university administrators fear that Oracle would stop supporting PeopleSoft's financial systems in an effort to force their institutions to switch to Oracle products. They were also concerned that the consolidation of the two leading providers of this type of software to higher education would result in higher prices.

A second commonly cited example of higher education's dependence on proprietary software is Blackboard. Over the past seven years Blackboard has put itself in a position where it has almost a 50% share of the VLE system market. Blackboard's power over its customers has been an ongoing source of frustration, as institutions believe they are forced to buy unwanted

features, and expensive customization efforts must be repeated when Blackboard announces that it will no longer support an earlier version of its software.

The fact that the higher education market is of relatively modest size also raises the question of whether the academic community is large enough to support its own software. Projects like Linux and Apache have been built by huge global communities, but then uPortal has been developed with minimal resources and now runs on several hundred campuses and is a well established and valued option. The Sakai project alone concentrated $6.8 million invested over two years by the Mellon foundation and the four partner universities who developed it.

Blackboard, the leading commercial courseware management system provider, set aside $14 million last year for research and development on its product. With proper coordination and commitment, could the community development model rise to sustain itself at such a scale? It would depend in part on the extent to which these projects could attract contributions from an international community and the extent to which member institutions supported their IT staffs' participation in such a commons-based production process.

4. What approach should higher education take to securing the future of open source projects?

In the UK we have JISC, the Joint Information Systems Committee joint between the library and computing communities in HE.

They have set up Open Source Technology Watch http://www.oss-watch.ac.uk/ [2]. In other countries there is no such body and in the United States it is left to the voluntary sector to work with communities which in most cases are supported much more by charitable giving from a variety of sources than are most European HE institutions.

However, the Mellon Foundation is supporting Open Source. Carnegie Mellon West University has set up COSI which will focus on methods and practices for developing, adopting, managing, and integrating systems that incorporate open source technology. COSI will establish a laboratory, library, and community website that can serve as a testbed and experience factory for open source software, as well as a site for student and faculty projects.

So Higher Education institutions need to keep in touch with the developments taking place as reported in these websites.

References:

1. Netke, Shirish. "The Real Open Source Revolution" SandHill.com, June 6, 2005. http://www.sandhill.com/opinion/editorial.php?id=30
2. JISC *OSS Watch Open Source Advisory Software Service,* 2007. http://www.oss-watch.ac.uk/
3. Centre for Open Source Innovation. http://cosi.west.cmu.edu/

"LIBRARY-IN-A-BOX" PROGRAM: A NEW EIFL OPEN SOURCE SOFTWARE INITIATIVE FOR LIBRARIES FROM DEVELOPING AND TRANSITION COUNTRIES

Bess Sadler
Head of Technical and Metadata Services for Digital Scholarship Services,
University of Virginia Library
USA
Tigran Zargaryan
Director, the Library of Academy of Sciences
Yerevan, Armenia

The use of open source software (OSS) has grown rapidly in the last years, and studies indicate that this growth is accelerating /1, 2, 3, 5/. OSS is being widely used in many domains, including libraries. However, many libraries (especially those in developing countries) are unaware of the options provided by OSS and so are looking to commercial vendors for support. Unfortunately, they are not receiving the support they need. Through its work with libraries internationally, eIFL[3] has become increasingly aware of widespread dissatisfaction with proprietary library automation products among eIFL member countries. This is partly because libraries in developing produced automation systems and digitization tools, but also partly because commercial tools created for large North American markets seldom take into account the needs of libraries in developing countries. Among the main reasons for this dissatisfaction are:

- Commercial products are often not well tailored to the different technological procedures being used in eIFL libraries.
- Major software giants are unlikely to invest in library automation initiatives. The library automation marketplace has become saturated with a few vendors who depend strongly on existing customers from the developed world. This puts the vendors in a strong position with regard to new automation customers, and could result in higher prices for the vendors' software and services. As libraries in developing countries find it harder and harder to afford commercial automation services, the already growing gap between information rich and information poor countries will be further exacerbated.
- Commercial software tends to require frequent and costly upgrades. Support for the old versions is often limited, or sometimes stopped entirely. Each time libraries upgrade, they must customize the software to meet their local library's needs. These customizations need to be repeated with each upgrade, and are costly, requiring many hours of time and often requiring upgraded hardware as well.

In 2005, eIFL began developing a program to advocate for and support the use of open source software in eIFL partner libraries. The goals of this program are to support libraries' local digitization activities and to tie national digital collections to emerging regional and global networks, all while taking into consideration the resource constraints particular to libraries in developing countries.

As a first step in this program, eIFL commissioned a report by Art Rhyno, examining the current state of OSS products available for libraries. This report was presented to the eIFL board

[3] eIFL (*electronic Information for Libraries*, an independent foundation registered in Netherlands) is a global network of library consortia in 50 developing and transition countries. It supports and encourages the building of national library consortia, and negotiates and advocates for the wide availability of electronic resources by library users. eIFL supports the "Open Access" initiative and helps its members build institutional repositories of locally produced content. For further details please see www.eifl.net

in June 2006, and was titled "Terms of Reference: OSS for eIFL Libraries: Advocacy and Outreach." Based on the findings of the report, some specific goals were formulated for eIFL's OSS program.

The initial goals of the project are:

- Support the development of a "Library in a Box" self-installation package, with the following components: Integrated Library Software; Repositories Management System; Link Resolvers; Portal and Federated searching software; Office suite; Internet tools; Authorization toolkit.
- Coordinate the development of easier deployment and experimentation platforms for a "Library in a Box" package using UBUNTU setup mechanism or XAMPP technology.
- Explore options for hosted deployment of library software, either within regions or through contributions from international partners.
- Establish "open source camps" for training/awareness raising purposes.
- Develop a modular training curriculum for libraries.

To achieve these goals, the following activities and actions are planned:

- Awareness-raising/education around the options in open source software.
- Advising on appropriate OSS applications for libraries, such as manuals, translations, best practice guidelines, and developing tests to gauge on how software is delivered to the libraries.
- Building local communities of expertise that can serve as a support network for the libraries.
- Defining options on how eIFL could influence the international OSS community to support localization/implementation/maintenance of OSS tools in consortium libraries, including the option for eIFL itself getting involved in a limited number of pilot projects.

For piloting purposes three hubs are already selected, which are clustered by geographic and language coverage. For geographic coverage the African continent has been selected, and for language coverage countries from Russian speaking and Arabic speaking territories have been selected. Such an approach will allow piloting libraries to help each other, and still allow the possibility of working in a multi-language environment.

During the project implementation phase local libraries will:

- Actively promote the project in their region.
- Localize different modules of the "Library-in-a-Box" package.
- Organize regional seminars, training courses, and meetings.
- Distribute the "Library-in-a-Box" package within libraries from a given cluster.
- Where necessary, provide libraries with technical consultation and installation assistance.
- Evaluate the local use of the package and gather feedback to influence future versions.

In addition to the immediate goals of providing eIFL partner libraries with needed software and technical infrastructure, the eIFL OSS program expects to produce other effects as well. For example, the "Library-in-a-Box" initative most likely will increase the competition in the library automation software market, which should result in positive fall-out for the libraries from developing countries as licensing and consulting fees are lowered and service levels are raised in order to compete with Library-in-a-Box. In terms of economic benefits , widespread adoption of "Library-in-a-Box" could mean that libraries from the developing world will lead the developed world in open source adoption /4/. In terms of sustainability, the eIFL "Library-in-a-Box" initiative will develop shared communities with distributed cost mechanisms, and well structured formal or informal groups for OSS maintenance and training purposes. And in terms

of leadership, the eIFL "Library-in-a-Box" initiative will help to fund and facilitate methods for providing credibility, publicity, stability, and coordination to the eIFL library network.

References:

1. Software and Collaboration in Higher Education: A Study of Open Source Software
July 26, 2006: by Paul N. Courant, Principal Investigator, Rebecca J. Griffiths.
Funders: The Andrew W. Mellon Foundation, Carnegie Mellon University,
Foothill-De Anza Community College, Marist College, Indiana University, the University of Michigan, Stanford University, the University of North Carolina, and The William and Flora Hewlett Foundation
2. Open Source Software - definition, licensing models and organizational consequences (introduction), Reinhard Altenhöner. World Library and Information Congress: 71th IFLA General Conference and Council, 2005
3. IFLA Information Technology Section newsletter. July, 2005.
4. Open Source in Developing Countries. Sanjiva Weerawarana, Jivaka Weeratunge. Published by Sida 2004, ISBN 91-586-8613-4
5. Why Open Source Software / Free Software (OSS/FS, FLOSS, or FOSS)? Look at the Numbers! David A. Wheeler**.** Available at http://www.dwheeler.com/oss_fs_why.html (accessed November 7, 2006).

OPEN ACCESS TO SCHOLARLY COMMUNICATION

Emilija Banionytė
Vilnius Pedagogical University Library Director
Lithuanian Research Library Consortium, President
Vilnius, Lithuania

Abstract
The aim of this presentation is to give general overview on Open Access (OA), to explain the philosophy behind it, to show what OA supporters are doing around the globe and to atrract more advocates for OA[4].

Why and when Open Access started?

The OA movement started with growing dissatisfaction at all levels:

- **scientists and academic authors** were not satisfied since their work is not seen by all their peers, so they did not receive the recognition they deserve;
- **readers** cannot view all research literature they need, as less and less information was available for them through their libraries, thus making further research less effective;
- **libraries** could not cope with growing journals prices and had to cut their subscriptions, thus they could not satisfy the information needs of their users.

The driving force behind open access has been gathering pace for several decades. It started especially growing with the shift of the outcomes of scientific research to the electronic environment. While submitting their papers to journals, authors often had to transfer their copyrights to the publishers, thus removing their control over the distribution and use of their work. This resulted in ridiculous situations – the author may not have a right to use his own work on his personal or his institution‘s web site, he often could not distribute his work in the class for his students without getting permission from the publisher. Sometimes the author could not even see his article published, if his institution did not have the subscription to respective journal, this also means his colleagues at the same university could not see his article either.

Because of rapidly growing journal prices (over 300% between 1975 and 1995[5]) libraries were forced to cut subscriptions, as their budgets were not growing that fast. This resulted in readers dissatisfaction, as they could not access information they need.

The Open Society Institute (OSI) started looking for possible ways to cope with the problems and held a meeting of a group of scientists and leaders exploring alternative publishing models in December 2001 in Budapest. The group concluded that “open access” was the goal and agreed on two main strategies for achieving it:

- open access journals and
- institutional/subject-based repositories.

A document called *Budapest Open Access Initiative* (BOAI) was signed then and December 2001 is considered the start of the OA movement.

What is open access to scholarly communication?

In using the term 'open access', we mean the free availability of peer-reviewed literature on the public internet, permitting any user to read, download, copy, distribute, print, search, or link to the full texts of the articles[6].

There are various misunderstandings about open access. It is important to understand that open access is not self-publishing, nor a way to bypass peer-review and publication, nor it is a

---

[4] This paper is based on *Open Access to Scholarly Communications* from the *eIFL Handbook on Copyright and Related Issues* http://www.eifl.net/cps/sections/services/eifl-ip/issues/eifl-handbook-on
[5] http://ec.europa.eu/research/science-society/page_en.cfm?id=3184
[6] http://www.soros.org/openaccess

kind of second class, cut-price publishing route. It is simply a means to make research results freely available online to the whole research community[7].

As mentioned above, there are two ways in which this can be realised: through open access journals and institutional/subject-based repositories.

Open access journals

An open access journal is a journal which is freely available online worldwide and does not rely upon the traditional subscription based business model to generate revenue. As everybody understands, publication of on-line journal – even if it is made freely available on-line - encounters some costs that somebody has to pay. Who? Open access journals employ a combination of new business models, among them:

- article processing fee;
- institutional membership;
- hybrid model;
- advertising (i.e. Google AdSense);
- sponsorship.

In order to understand how these new business models work, OSI developed business guides for open access journals:

- Guide to Business Planning for Converting a Subscription-based Journal to Open Access[8] ;
- Guide to Business Planning for Launching a New Open Access Journal[9] ;
- Model Business Plan: A Supplemental Guide for Open Access Journal Developers & Publishers[10] .

Many new open access, peer-reviewed journals had been launched in recent years. Just to mention a few: *Public Library of Science* (PLoS), *BioMed Central* (over 150 journals), *Bioline International* (over 50 journals), *First Monday*, etc. How to find these journals? Most of them are registered in the *Directory of Open Access Journals*[11]. This directory is maintained by Lund University in Sweden and is free for all open access peer-reviewed journals. If you happen to know one that is not yet registered – please advise the publishers to register it. The service is free. There are over 2,700 journals registered in the directory (May 2007) and this number is growing.

Although traditional and commercial publishers are not very happy about open access, some of them started experimenting with open access. **Oxford University Press** has a programme called *Oxford Open*, *Blackwell – Online Open*, **Springer** – *Open Choice*, **Elsevier** has a hybrid model for six Physics Journals, **National Academy of Sciences** put *Proceedings of the National Academy of Sciences* on open access. Most of these programmes have converted selected titles or journals to open access.

Institutional repositories

An institutional repository is a publicly accessible repository (archive) where all the works published by researchers/authors affiliated with the university/academy can be posted online. Such availability of research outcomes contributes to the status of the institution by displaying the intellectual output of the institution. All work is deposited in the repository by using interoperable software, which allows the works in the repositories to be searched and harvested. Most popular software is DSpace, E-Prints, Fedora. Such software is called Open Archives Initiative (OAI) compliant. Those interested in setting up institutional repository should

---

[7] http://www.jisc.ac.uk/uploaded_documents/JISC-BP-OpenAccess-v1-final.pdf
[8] http://www.soros.org/openaccess/oajguides/business_converting.pdf
[9] http://www.soros.org/openaccess/oajguides/business_planning.pdf
[10] http://www.soros.org/openaccess/oajguides/oaj_supplement_0703.pdf
[11] http://www.doaj.org

examine *A Guide to Institutional Repository Software*[12] in order to choose software most suitable for their needs.

How to find institutional repositories?

Most of them are registered in the *Directory of Open Access Repositories - OpenDOAR*[13]. This directory is maintained by the University of Nottingham in UK. If you happen to know of a repository that is not yet registered, please advise the compilers to register it. The service is free.

While setting up an institutional repository copyright issues are very important. In order to find out publishers copyright policies on self-archiving, one can consult SHERPA/RoMEO project[14]. It provides a summary of permissions that are normally given as part of each publisher's copyright transfer agreement.

International Support of Open Access

The concept and economics of open access are subject to heated debate amongst academics and researchers, university administrators, librarians, funding agencies and commercial and learned society publishers. There are lots of supporters of open access, but this movement also has strong opposition, mostly from commercial publishers' side, as they see open access as big threat to their currently very prosperous business. The debate continues while the landscape of scholarly communication has already changed forever.

The Budapest Open Access Initiative (BOAI) (2002) was the first major international statement of principle and commitment in support of Open Access. Launched following a meeting organised by the Open Society Institute, the BOAI offered the first definition of Open Access and sets out the strategies and goals for access to scholarly communications.

In 2003 the Howard Hughes Medical Institute (HHMI) and the Max Planck Society both organised meetings which addressed Open Access from a funder's perspective. The HHMI meeting produced *the Bethesda Statement on Open Access*[15] and the Max Planck conference crafted *the Berlin Declaration*[16]. Both *the Bethesda Statement* and *the Berlin Declaration* provide definitions of Open Access which focus on the role of funders.

The Wellcome Trust in the UK was the first research funder to mandate Open Access to the research which they support. Governments and legislators have also become interested in how to maximise access to publicly funded scholarly research. In 2004, the UK House of Commons Science and Technology Committee recommended that all UK higher education institutions and government funded research councils establish free of charge online institutional repositories and called for support of open access journals. This important report contributed to the adoption of Open Access mandates by five out of the eight Research Councils in the UK. In 2005, the Parliament of Ukraine recommended to mandate open access for publicly funded research, which has been followed by the establishment of a National Network of Open Access Repositories with ten institutions. In 2006, a European Commission funded *Study on the scientific publication markets in Europe*[17] recommended that funding agencies should establish a policy mandating European funded research publications be made available in open access archives. This was further discussed by the Commission in February 2007 in *the Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee on Scientific Information in the Digital Age: Access, Dissemination and Preservation*[18]. The Commission invited the debate among different stakeholders and policy makers, also set up actions at European level. In the US, the proposed *Federal Research Public*

---

[12] http://www.soros.org/openaccess/pdf/OSI_Guide_to_IR_Software_v3.pdf
[13] http://www.opendoar.org/
[14] http://www.sherpa.ac.uk/romeo.php
[15] http://www.earlham.edu/~peters/fos/bethesda.htm
[16] http://oa.mpg.de/openaccess-berlin/berlindeclaration.html
[17] http://ec.europa.eu/research/science-society/pdf/scientific-publication-study_en.pdf
[18] http://ec.europa.eu/research/science-society/document_library/pdf_06/communication-022007_en.pdf

Access Act (2006) aims to mandate Open Access to the research funded by the 11 largest governmental funding agencies (e.g. National Institutes of Health, National Science Foundation).

Open access and developing and transition countries

Although open access movement started and is speeding up in well-developed countries, the situation with scholarly communication in developing and transition countries is much worse. Since the cost of academic journals is prohibitive for many developing countries, scholarly communication is for them severely restricted. This causes a huge problem. A survey conducted by the World Health Organisation in 2003, found that in 75 of the poorest countries, 56% of the medical institutions had been unable to access *any* journals over the previous five years[19]. In a 2006 report, the Academy of Science of South Africa found that over the past fourteen years, one-third of South African journals have not had a single paper cited by their international counterparts. Fewer than one in ten of South Africa's 255 accredited journals has been cited enough to feature in the main international research databases, despite South Africa being the continent's leading publisher of research[20]. Visibility for research output from South Africa, and other developing countries, must be increased dramatically so that research from developing countries is incorporated into the global knowledge pool, so vital to the resolution of global issues such as climate change or the spread of infectious diseases. It has been shown that articles made available electronically on an open access basis have been cited on average 50% more than non-open access articles from the same journal[21].

The Salvador Declaration on Open Access: the Developing World Perspective[22], adopted at an international seminar in Brazil in 2005, states that in a world in which science is universal, exclusion from access to scientific information is not acceptable. Open Access will increase the capacity of scientists from developing countries to both access and contribute to global science, facilitating their participation and strengthening the coverage of topics of direct relevance to developing countries.

The theme of integrating scientific information from developing countries into the global body of knowledge is reflected in the model for a *National Open Access Policy for Developing Countries*[23]. This was agreed in November 2006 at a workshop convened by the Indian Institute of Science, the Indian Academy of Sciences and the M S Swaminathan Research Foundation, which bemoaned the fact that unique research carried out in countries representing 80% of the world's population remains largely invisible to international science.

The recommendations carried out by the International Conference on Strategies and Policies for Open Access to Scientific Information held in Beijing, June 2005:

- require that all government funded research be published in OA;
- reform current system of review of S&T achievements so as to encourage academics to publish in OA;
- support leading journals to convert to OA
- can be taken as a good example for all countries around the globe.

Developing and transition countries already have pioneering initiatives that promote open access and they are playing an important role in shaping open access policies worldwide. An OSI sponsored initiative by *Electronic Information for Libraries* (eIFL.net) led to a series of workshops in China, Lithuania, Poland, Serbia, Southern Africa and Ukraine. Results included the creation of working groups on open access, pledges of support from national research foundations, national recommendations and the establishment of open access repositories.

---

[19] http://webcast.in2p3.fr/openaccess/aronson.ram

[20] http://www.scidev.net/quickguides/index.cfm?fuseaction=qguideReadItem&type=1&itemid=2828&language=1&qguideid=4

[21] http://eprints.ecs.soton.ac.uk/11688/

[22] http://www.icml9.org/meetings/openaccess/public/documents/declaration.htm

[23] http://www.ncsi.iisc.ernet.in/OAworkshop2006/pdfs/NationalOAPolicyDCs.pdf

Although the work has started, there is much to be done, understanding of open access is still very little in the developing world. Good advocates are needed. Why not become one?

Libraries and open access

Committed to ensuring the widest possible access to information for everyone, librarians have by and large been amongst the most vocal advocates for open access. As one of the stakeholders most aware of the impact of the "serials crisis", they are anxious to seek ways of removing the permission and price barriers that limit access. Librarians are sometimes the focal point for open access within higher education institutions and the library may be the home of the institutional repository. Many library associations around the world have issued statements supporting open access or have signed major open access declarations.

Librarians should inform themselves of the growing wealth of high quality, peer reviewed open access scholarly material available to all and should provide access to their users. They can also be – and often are - a driving force in the open access movement.

References:

1. Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003): http://oa.mpg.de/openaccess-berlin/berlindeclaration.html
2. Bethesda Statement on Open Access Publishing (2003): http://www.earlham.edu/~peters/fos/bethesda.htm
3. Budapest Open Access Initiative (2002): http://www.soros.org/openaccess/
4. Directory of Open Access Journals: http://www.doaj.org/
5. Directory of Open Access Repositories: http://www.opendoar.org
6. eIFL Open Access Program: http://www.eifl.net/services/services_open.html
7. eIFL-IP Handbook on Copyright and Related Issues for Libraries (2006): http://www.eifl.net/cps/sections/services/eifl-ip/issues/handbook
8. A Guide to Institutional Repository Software (2004): http://www.soros.org/openaccess/software/
9. International Federation of Library Associations and Institutions (IFLA) Statement on Open Access to Scholarly Literature and Research Documentation (2003): http://www.ifla.org/V/cdoc/open-access04.html
10. National Open Access Policy for Developing Countries (2006): http://scigate.ncsi.iisc.ernet.in/OAworkshop2006/presentations.htm
11. Open Access Journal Business Guides: http://www.soros.org/openaccess/oajguides/
12. OSI's Information Program: http://www.soros.org/initiatives/information
13. Research Councils UK position on issue of improved access to research outputs (2006): http://www.rcuk.ac.uk/research/outputs/access/default.htm
14. Salvador Declaration on Open Access: The Developing Country Perspective: http://www.icml9.org/meetings/openaccess/public/documents/declaration.htm

DEVELOPING THE AMERICAN UNIVERSITY OF ARMENIA INFORMATION LITERACY PROGRAMME: AN EXAMINATION OF SOME ISSUES

Bella Avakian
American University of Armenia
Yerevan, Armenia

Abstract
The goal of library instruction remains the same as its has been, which is for all students to learn successful research strategies and information literary skills.
New learning communities are developing on our University campus. Librarians and faculty need to be involved in the shaping of these communities, as well as to become willing participants in facilitating the learning process. The first information literacy modules were delivered on a pilot basis. The programme today delivered as part of required academic writing courses in the Academic Preparatory Programme. Accrediting agencies are now considering information literacy programmes as measures of an institution's performance to encourage education in the use of academic resources. The students valued the library instructions offered and even inclined to request that more library-related instruction be incorporated in the future.

The American University of Armenia was founded in 1991 to provide an American style education within the environment and context of the Republic of Armenia. English is the language of instruction for all courses, and for most students English is a second language. Currently, the American University of Armenia's academic programmes provide graduate education in Business Management, Industrial Engineering, Computer and Information Science, Political Science, Health Sciences, Law, Comparative Legal Studies, and Teaching English as a Foreign Language.

Librarians and faculty recognized the importance of information instruction from the beginning of the university's existence. In 1992 and 1993 as the library collections were being developed, librarians scheduled time with students and the visiting professors so that they could become aware of services and resources available to them. By the end of 2000, the library collection had reached 30,000 volumes. New facilities included a library classroom equipped with 10 computers, allowing students hands-on experience with the library catalogue and library databases. University faculty and instructors increasingly requested "library sessions" for their classes and by the end of the 2005/06 academic year a total of 16 sessions had been delivered to 270 students.

Early collaboration between faculty and librarians was based on service requests and responses. Faculty who recognized that research skills would benefit their students contacted the librarian and organized session time and content. Throughout the first years of library instructions, results were fruitful in that those students who attended sessions quickly became familiar with the library environment and acquainted with the library's resources and services. However, for those students whose professors didn't incorporate instructions session, results were less certain.

In 1998 American University of Armenia initiated an accreditation process with the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges in the United States. Until this time, the terms used by librarians and faculty for the skills gained through the library sessions were "library orientation", "library training." "information literacy" as a term had not yet been introduced to the university. This concept quickly changed into defined information literacy as "an intellectual framework for identifying, finding, evaluating and using information."

Information Literacy modules are delivered as part of required academic writing courses for APP students. They attend a class in the library early in the semester. Scheduling and the session details are arranged through collaboration between the librarian and the faculty. The librarian contacts course coordinators to discuss the upcoming sessions and to schedule classes. E-mails are sent to faculty to explain details regarding students preparations needed for the class,

and to encourage faculty to suggest appropriate research topics. Prior to the session students receive a list of instructions covering basic library, research and information concepts. A typical information literacy class lasts 50 minutes. The librarian demonstrates various searches to emphasize the mechanism of developing a search strategy of the online resources. Emphasis is put on use of the library catalogue, periodical databases and web resources.

In order to identify strengths and weaknesses of the programme some interviews were conducted with course coordinators and the Associate Dean of the Department of English Programs. The existing faculty confirms that the quality of student research has improved. Student assignments are beginning to reflect the use of academic resources with less reliance on the use of web sites as the only source of information. Students indicate that Information Literacy classes help them in making more effective use of library resources. While feedback has been generally positive, areas of concern have always been noted. Some students have conveyed that the information in the course is not useful to them or that they find it repetitive; some students assume that they already have information literacy skills if they can use the Internet; or students have little or no experience with library use and do not adequately understand the importance of research and information skills. In addition, there seems to be a general consensus that the students' secondary education didn't highlight the value of critical thinking and information skills. We librarians have observed that students often demonstrate an inadequate understanding of basic library or information skills.

Our programme is still in the early stages and developing. Being a relatively new programme in a small university enables us to build an attractive Web-based information literacy tutorial based on the ACRL Information Literacy Competency Standards. We have identified areas where the improvements can be made:

- Improve communication with faculty – more regular communication is needed, hold an orientation meeting each year for librarians and faculty participating in the Information Literacy programme; use library web pages to educate and inform faculty and students about the Information Literacy programme; create a pamphlet to distribute to each faculty member at the start of the semester.
- Raise the profile of the programme - currently the IL programme appears only as a small segment to APP whose focus is English competency and academic writing skills. Faculty in areas other than academic writing will need to join the Information Literacy programme and ensure that students are not only succeeding in their major areas of study, but are also developing information skills and the related critical thinking and evaluation required for effective information use. Faculty themselves need to ensure that they stay current with their own information skills. The library provides regular workshops for faculty to assist them with improving their own skill levels within the rapidly changing information environment.

While progress has been made, more collaborative work is required as librarians and faculty address the challenges of delivering and assessing the information literacy programme. Options for improvement are being explored and implemented as librarians and faculty strive for the best possible Information Literacy programme.

References:

1. American University of Armenia. http://www.aua.am
2. Budd, John. 1998. "Electronic Information" *The Academic library: its context, its purpose, and its operation*. Libraries Unlimited, Inc.

eLEARNING IN COMPUTER SCIENCE

Yevgeniya Sulema
National Technical University of Ukraine "Kyiv Polytechnic Institute"
Kyiv, Ukraine

1. Introduction

Computer technologies are relevant in almost every field of human activity. It is difficult to imagine a present-day office without computers and networking technologies. That is why computer science as a field of knowledge is very attractive for young people who want to obtain a profession with good job opportunities. Many Ukrainian Universities offer educational programmes in the field of computer science.

Accordingly to Bologna principles higher education in Ukraine is realized in two stages: a Bachelor Programme and a Master Programme. From the point of view of the form of training there are two main types of university studies: normal form of education and education by correspondence. Last year's e-education becomes more and more popular. It is considered as equivalent to an education by correspondence.

E-learning in the National Technical University of Ukraine "Kyiv Polytechnic Institute" (NTUU "KPI") is provided by the Ukrainian Institute of Information Technologies in Education, e-Education Center, Virtual Laboratory for Metrology at Information and Measuring Engineering Department (Faculty of Aircraft and Space Systems), other departments and individual teachers. The e-Education Center [1] provides e-learning in computer science and technologies. The Center was established in 2005 within the framework of UNDP Project "Transfer of Information Technologies (IT) to Ukraine" in cooperation with Polish-Japanese Institute of Information Technology (PJIIT) [2]. The e-Education Center is intended for raising the level of training of specialists in information technologies.

2. BACHELOR PROGRAMMES IN COMPUTER SCIENCE AND TECHNOLOGIES

The field of computer science and technologies is covered by several Bachelor Programmes in NTUU "KPI". They are "Computer Science", "Computer Engineering" and "Programme Engineering". In accordance with the guidelines of UNDP Project "Transfer of IT to Ukraine" and the related Project of Polish Ministry of Foreign Affairs 47 e-learning courses have been created for the Bachelor Programme "Computer Science" in the cooperation between PJIIT, NTUU "KPI", Odesa Polytechnic University and Lviv Polytechnic University.

The structures of the Bachelor Programmes "Computer Science", "Computer Engineering" and "Programme Engineering" are similar and include the following sections:

1) Socio-economical,
2) Fundamental,
3) Professional,
4) Practical training,
5) Subjects by the University's choice,
6) Subjects by student's choice.

Fig.1 shows the time proportion between these sections. An essential part of the professional training is provided by fundamental subjects, professional subjects and subjects by the University's choice. These subjects take about three quarters of the time of the Bachelor Programmes.

Fig.1 Time proportion for the basic Bachelor Programme

From the point of view of e-learning the subjects within the whole Programmes have differences. Some of the subjects allow "pure" e-learning. First of all they are socio-economical

and humanitarian disciplines. For learning of these subjects students can get all the theoretical knowledge presented in the teaching materials from the remote information resource via Learning Content Management System (LCMS) and they can have practical discussions using telecommunication tools of LCMS (forums, chats, internal e-mail service). At the same time "live" communication between a teacher and students in a classroom has special value for forming many necessary skills. To fill in the communicative "gap" in e-learning, videoconferences can be helpful. However videoconferencing demands special equipment and high speed network connection.

Many subjects of the Bachelor Programmes demands face-to-face studies. They are some fundamental and professional disciplines. The fact is that learning in natural sciences and technical education demands the use of specific equipment for making experiments and practical work under supervision of the teacher.

The key solution could be blended learning that combines e-learning and face-to-face studies. In many cases blended learning is preferable to "pure" e-learning. For instance it is more effective for the Bachelor Programmes "Computer Science", "Computer Engineering" and "Programme Engineering".

In 2007/2008 academic year the e-Education Center offers the Bachelor Programme Computer Engineering. It is available in two options: as variety of education by correspondence and as the second diploma degree. In both cases the educational process is realized in the form of blended learning.

In the first case the Bachelor Programme is intended for working young people who would like to obtain the first diploma degree. The educational process assumes that an academic year includes two semesters and two sessions. In the course of a semester the studying process is realized as e-learning. It means that the students use LCMS to get learning materials, communicate with tutors, pass tests, make some exercises and so on. Every session the students come personally to the University for about 10 day to practise in laboratories, pass exams on subjects have been learnt during past semester and to have basic lectures on each new subject to be learnt in the next semester. The duration on this variety of the Bachelor Programme is 4½ years.

In the second case the Programme is offered to students of NTUU "KPI" who study at non-computer specialties and want to obtain the second diploma degree in the field of computer technologies. The aim is to give students a wider profession with better job opportunities. For this variety of the Bachelor Programme "Computer Engineering" an academic year also consists of two semesters and two sessions. However during the semester the educational process is fulfilling in a different way. Students have both e-learning and face-to-face studies. In the e-learning method, they get learning materials, communicate with tutors, pass tests, make some exercises, etc. At the same time the students have face-to-face laboratory lessons in the University every week. It is necessary to shorten the term of the Programme: in this case it lasts only two years. Since the students continue the studies in their original faculty, where they study the standard set of socio-economical subjects, the Bachelor Programme "Computer Engineering" as the second degree programme doesn't include these subjects to avoid duplication of subjects in the first degree and in the second degree programmes. It also allows them to shorten the time spent in studies in the Center.

3. THE TEST GROUP E-LEARNING

Before opening the enrolment to the Bachelor Programmes and approving the technology of e-education the pilot group's studies were organized in the e-Education Center. We chose the course *Relational Data Bases* developed by Professor Banachowski (PJIIT). The pilot group included fourteen students. They were mostly students of the third course. E-training started in March 2006 and lasted two months. Students had to learn lecturers' materials, solve practice tasks, participate in on-line and off-line discussions and pass tests. During two months students had 8 tests. And the average grade of the majority of students exceeded *good*. Only one student

had low average mark (*satisfactory*). It proved the effectiveness of e-studies. After successfully passing all the tests students are awarded the Certificate of Completion.

Analysis of the statistical data (fig.2) on the study process has been completed after finishing the course. It has showed interesting correlations between grades of students and their activeness during the studies. All the group of students can be divided logically into three subgroups.

The first subgroup is characterized by correspondence between activeness of students and their grades. Thus, two students, who have the best average grade 4.88 points, also lead in number of visits to the LCMS. A similar situation is in the case of the students who had the worst or no results. Thus, the student with the lowest grade (3.00) accessed the LCMS 12 times, the least number of visits among the students who have completed the course. Two students have left the course – they visited the system several times and then stopped their studies because of private reasons.

Fig.2 The correlation between grades and frequency of LCMS use

The second and the third subgroups do not show such correlation between activeness of students and their grades. The second subgroup includes the students who visited the on-line system rarer than students of the third subgroup but they got grades better than expected. The third subgroup is opposite to the second subgroup – the students accessed the on-line services often enough. At the same time they got grades lower than we would have expected. If we don't take into account technical problems with the Internet connection, this peculiarity can be explained from the position of psychology. Psychologists distinguish several types of learners according to their temper and preferences [3-5]. It is obvious that in general students of the second subgroup need less time to learn the lecture material than students of the third subgroup.

From the technical point of view the test group studies were aimed at the testing of the LCMS. During the preparation period, several LCMS have been tested in the e-Education Center. Special attention was paid to Moodle and EDU-system. Moodle is a very popular open-source LCMS [6]. The word Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment. This LCMS has many features expected from an e-learning platform including forums, content managing, quizzes with different kinds of questions, blogs, wikis, chat, glossaries and so on. Moodle is modular in construction and can readily be extended by creating plugins for specific new functionality. EDU-system has been created by specialists of PJIIT. It offers all the necessary services to a student such as teacher's materials base, forums, chats, tests, etc. At the moment the majority of e-learning courses of e-Education Center are offered to students through EDU-system. The test group studies have proved the effectiveness of EDU-system.

4. SUMMARY

E-learning erases borders and makes knowledge available to everyone who wants to study and master their chosen profession. Accordingly to statistics, every year the number of institutes that offer e-learning courses and programmes rises. The e-Education Center at NTUU "KPI" helps young Ukrainians to obtain Bachelor Degrees in the field of computer technologies. It gives the graduates more chances to be specialists in the areas demanded by the modern job market.

References:

1. http://eec.ntu-kpi.kiev.ua
2. www.pjwstk.edu.pl
3. http://www.english.qmul.ac.uk/ShakesinClass/Types%20of%20Learners.html
4. Joy M. Reid, "Learning Styles in the ESL/EFL Classroom", Newbury House

5. http://www.lessontutor.com/sm1.html
6. http://www.moodle.org

‘E-PERFECT’ BUT NOT ‘E-READY’: LONG WAY TO E-LEARNING

Samvel Karabekyan, Marat Yavrumyan
Yerevan State University
Yerevan, Armenia

The main task, which arises during the very first approach to the problems of informational technologies’ incorporation into the university educational system, is concerned with creation of the technological, financial, methodical and “professional-psychological” readiness basics of the academic and administrative staff for insight and realization of the e-learning programmes. At the same time, no matter how unexpected it be, technological and financial problems are the least hard-to-solve tasks. Much harder is the redirection of the destination bases of academic, and not less (if not more) administrative staff of higher education institutions, i.e. solving of tasks of the professional and psychological adaptation to the changes in the educational sphere.

First of all the problem lies in the fact that the impetuous incorporation of information technologies into all spheres of modern life, and their growing accessibility considerably lighten the adaptation of subsystems of informational space (including education-related ones) to the new technological means. But in such by nature conservative spheres like education, adaptation processes come across conceptual plan obstacles, and therefore informational technologies in higher education, in spite of considerable progress, still remain an accompanying, and not core factor of the transmission of educational information. One of those deterrents is the traditionally dominating “visual-contact” conception of educational process organization, which bases on the notion obligatoriness of personal contact during transfer and checking of information adoption.

Just therefore, incorporation of the information technologies into the educational process, relating to the forms of education not assuming personal contact – distant education causes a certain rejection of classically prevalent educational continuum and is viewed as something just imitating educational process - its certain sublimate.

Let’s ask a question: Is the availability of the visual-contact environment a necessary condition for educational process organization? And if yes, can we contend, that during distant learning the educational process’s parameters alter so much, that deform the main components, which determine the structure of a formal education system?

Main doubts, which usually rise in this regard are connected with the understanding of virtuality, associated with the newest information technologies. As a rule, it is considered to be the main difficulty during the distant educational process, as traditionally realization of educational act in real time and space is considered as a necessary condition for the teaching programmes. The very combination of space and time factors used to be considered the main component of the visual-contact system of education, though even so, each of these constituents is optional during the formal ways of education (the considerable proportion of the educational process takes place out of real time and space operation mode, when the base system component – the so called “contact watches” and knowledge control process require combination of both space and time components into one unified process) on the other hand no such combination takes place during the distant forms of education.

Most likely, the problem lies in elementary substitution of concepts. In reality, classical class-fixed principles of an internal education system – time and place – factually play a role of a necessary technical condition, - which (and not the visual contact at all) creates the ecological environment for transfer of the educational information. I.e. the very context of transfer of the educational information, instead of the information as such, constitutes the essence of the educational process, raising the transfer and reception of the information to a level of education system. If we add, the context by its nature is a virtual concept, principally not segmentable and not separable into components, as against the text way of information transfer, which is segmentable, able to be transformed into physical sizes of acoustic or graphic type, it is easy to come to a conclusion that the very virtuality always defined the nature of the education process,

and so the problem of transition from contact – visual education to the distant – visual can be removed in case of such approach.

It is clear, that the second problem which arises during the transition from the contact educational technologies to the distant ones is connected with the necessity of switching to some kind of a "cultural code" – transition to other culture of contact. The culture of electronic contact, or e-culture is often considered as *Ersatzkultur*; thus it supposes, that the e-culture is poorer than the real one, as it facilitates and accelerates in time the access and mastering of information, and the increase of the speed and the volume of information inflow leads to superficiality of its perception and as a consequence affects its quality.

Not denying the availability of problems of such a kind, we shall notice, nevertheless, that on the other hand, in a high-speed mode of e-culture the amount of irrelevant information considerably goes down, as the attention concentrates on the main stream of the information sought, whereas in contact culture the amount of the information irrelevant to the education purposes is too great and there are risks to influence a significant number of subjective factors. Respectively, the problem of quality in e-culture significantly changes its angle and the main parameter of quality becomes the achievement of a maximum objective educational result.

From the point of view of management of the educational process, the transition to e-culture is hindered by the widespread strict hierarchical administrative schemes, based on aspiration for total control, as in a high-speed mode of e-culture they cease to function by definition.

REAL LIFE – VIRTUAL LEARNING ENVIRONMENTS

Ilmar Nopri, Master of Arts in Education
Estonia

Self-studying should be considered as one of the best methods to learn. Going through the material alone gives a great advantage. In e-learning such a method has many pluses.

We all know the possibilities of MySpace, YouTube, Orkut and Wikipedia. Many use Skype and other similar programs to communicate. Along with forums, blogs have also gained popularity in debating and expressing. The socialization of Internet is no longer a rarity as it is getting more and more popular. It would be wise to use all those perks in studies. Voluntary participation in such projects brings the quality of learning to totally new level.

Real life becomes a new learning environment where learner's motivation can be used. In a country where 40% of homes have personal computers and 82% have access to the Internet and there are more than 700 public WiFi locations (51 for every 100 000 persons) and 62% of the population uses the Internet, new possibilities have risen to enhance quality of learning. With e-State available for everyone who wishes it, there are many ways to gain access to the needed materials. The popular portals in Estonia (Hot and Delfi) are able to create good conditions for both learners and teachers. Those portals provide users with a possibility to store mail, contacts, materials and calendars in one place with also an environment to communicate (this is similar to special environments created for studying) - what more is needed for high quality studying.

Advancing from Learning management system to a Personal learning environment we achieve a new level. WWW as a medium was created by the development of infotechnology. Originally it was dominated by personal web page and information could be browsed in solutions similar to Britannica Online. This medium is changing constantly. The communication is developing, conventionally static home pages are being replaced by blogs, and Wikipedia-like environments are becoming more important as sources of information. The static learning materials, centralized studying environments and individual learning in an isolated institution are left in the past. Considering all this we can move on. Upgradeable materials (by both learners and tutors) will gain further importance. Decentralized Internet will give extra synergy to knowledge through communication. Networks and communities will create autonomous, personalized and learner-friendly environments. The role of the tutor will grow harder and more liable but the end result should be pleasant for everyone. It is not about the good grades but the ability to manage well in the life.

TRAINING THE EDUCATORS USING ICT IN LITHUANIA

Assoc. prof., Dr. Danguole Ruthkauskiene, Airina Volungeviciene, Marius Siegas
Kaunas University of Technology
Assoc. prof., Dr. Gvidas Ruthkauskas
Lithuanian University of Agriculture
Lithuania

Introduction

During the decades since establishing the infrastructure of e-learning in Lithuania, training the trainers has been the most important strategic aspect, though shifting technological tools and consistently changing the spirit of learning would not allow the formulation of a straightforward educator-training policy in the country, as was the case in other European countries.

While preparing its citizens for integration into the Information society, the priority tasks of the continuing education system are to provide them with the right for continuing self development and learning and to create the conditions for the fulfillment of these aims. The most important elements of the Information society are communication systems including most advanced information communication technologies (ICT).

It is difficult to assign the process of e-learning to some traditional research area. It is a complex process including adult education, permanent education, information technologies and management issues. E-Learning systems allows people to choose the place, time and pace for their study corresponding to their needs and possibilities. It is important to notice that e-learning at the moment is one of the priorities of the education system development in any country.

In Lithuania, the education development strategy for 2002- 2012 **defines the priorities for the Lithuanian educational policy, its aims and tasks, as well as the means, time and resources necessary to develop effective, coherent, accessible education system which is supposed to become a resource of the country's cultural and economical power and a guarantor of its national safety.**

Global context on Education using ICT

National economies become more internationalized, with the increasing flow of information, technology, products, capital, and people between nations. Changes have already made significant shifts in national economies from industry to information. These trends pose new requirements to educational systems that have to absorb changes quickly to be able to prepare students with the knowledge and skills needed to thrive in a new and dynamic environment of continuous technological change.

Many countries are putting efforts to affect changes in the teaching/learning process and here ICT provides a set of powerful tools that may help in transforming the present isolated, teacher-centered and text-bound classrooms into learner-focused, interactive knowledge environments [1, 2, 3, 4, 5].

To accomplish this goal it is necessary to change the traditional attitude to the learning process and understand how the new digital technologies can create new learning environments that help students to construct their own knowledge. More and more educational authorities and educators believe that new views of the learning process based on ICT may play an important role in bringing educational systems into alignment with the knowledge-based society.

e- Learning in Lithuania

The European Commission raised main tasks to be fulfilled while reforming the education system in Lithuania:

1) innovated regulations should be consistent with requirements of the European Union with a focus on decentralization of all education links;

2) develop long-term programmes for preparing and improving qualification of teachers in different subjects; the focus should be on social development and foreign languages;
3) develop comprehensive programmes for raising managers' qualification to ensure that reforms are implemented;
4) review Lithuanian training content, teaching standards and education levels to assure that there are met requirements of European learning content and standard systems;
5) transfer to continuous education system comprising industry and business enterprises;
6) **expand correspondence and distance education to provide all required possibilities to get education for all Lithuanian citizens;**
7) pay attention to the needs of national communities.

This proves how much the European Commission supports and emphasizes open and distance education.

As we mentioned, ICT in the vocational training is one of the main research and development priorities in every country. While implementing this thesis in Lithuania, we have to:

- Create ICT development and employment structure for continuous education that could be used by everybody willing to raise his/her qualification.
- Establish regional learning centres carrying correspondence (distance) education. Expand modern correspondence (distance) education technologies in all learning institutions (especially in schools and colleges).
- Establish public consultation learning centres – laboratories working in cohesion with higher and secondary schools.
- Employ broadband services (e-mail, file transfer, videoconferences, ISDN, World Wide Web).
- Get involved into European education system while retaining Lithuanian mentality and taking EU best practice.
- Carry correspondence education based on network, CD, DVD interactive programmes, world data banks. Implement strategic planning of own system development while ensuring its significant employment.
- Pay special attention to the quality and dissemination of methodical material and problems of institutional partnership.
- Develop new teaching and learning strategies.
- Focus on training of teachers using ODL possibilities.
- Establish system for preparation of methodical learning material.
- Develop course accreditation system what is a special focus while integrating into EU.

In this process, there should be involved schools together with regional centres, universities, public, private and non governmental organizations. This could be promoted and supported by different unions and associations [6].

National Strategies for Distance Learning (DL) Development and Support

ICT always offer new opportunities to support the delivery of Distance Learning (DL). Therefore, the Ministry of Education and Science of the Republic of Lithuania supports scientists of Lithuania and encourages them to perform research activities related to application of ICT in education.

Programme **Information Technologies for Science and Education** (ITMIS) was confirmed by the Minister of Education and Science on January 30, 2001. The main objective of this programme is to create information environment of science and study in Lithuania, aiming at:

- accumulating knowledge about science and study, their usage in institution activities, while making decisions and representing science and studies of Lithuania in the world wide computer networks;
- helping scientists, teachers and students to obtain required information;
- using ICT for Lithuanian people education;
- using ICT in education and training of the population.

The ITMIS programme is made up of three basic parts closely linked together – sub-programmes dealing with information of the following systems:

1. **Lithuanian Higher Education and Research Information System** (LieMSIS).
2. **Development of Distance Education Network in Lithuania** (LieDM).
3. **Lithuanian Academic Libraries Network** (LABT).

All performances are implemented using LITNET resources. In the process of implementation, the above programme will be supplemented with new sub-programmes.

Academic and research computer network LITNET

LITNET - The Academic and Research Network in Lithuania - is an association of universities and educational institutions. LITNET is primarily funded by the Ministry of Science and Education. LITNET develops and provides advanced services of national and international internet access to the Research, Academic and Education communities of Lithuania. The network connects 64 schools of higher education, 1280 organisations, 65 research institutions, 958 education institutions, 111 cultural organisations, 115 NGOs, and more than 800 secondary schools [7].

Figure 1. LITNET, 2007

LITNET's networking infrastructure serves as the foundation for advanced computing applications, BalticGRID and national projects. LITNET offers national and international connectivity, and evolves according to technologies' improvements and available capacity infrastructure. The main LITNET activities include:

- construction of broadband network infrastructure supporting science, matching similar installations in other European countries, including optical technologies and bandwidth on demand;
- development and verification of pilot services and applications for information society, creating a base for new developments in science, education, health care and services;
- creation of competitive conditions for active development of e-services for new applications in information society (including IPv6, VOIP, IP television).

Figure 2. Internet connection in rural areas – 2006

The LITNET backbone has 10 Gbit/s between Vilnius and Kaunas and a 1 Gbit/s ring between the 5 major cities. Leased lines provide 10-50 Mbit/s connectivity to other 31 cities. 1 Gbit/s link connects LITNET to the Pan-European Research and Education Network, GEANT.

Lithuanian Higher Education and Research Information System (LieMSIS)

LieMSIS is a guarantee for successful development and competitive ability of all its institutions, ensuring proper quality of higher education. Initiators of the LieMSIS development are The Department of Science and Technology of the Ministry of Education and Science, as well as Lithuanian universities [8].

The main objective of the project is to empower academia with e-Business functionality. LieMSIS will empower universities, colleges, and research institutions to enhance services

provided to students and employees, streamline business processes, and boost the bottom line by introducing "Self Service anytime and anywhere" principle.

LieMSIS will offer sophisticated e-business functionality and future-focused management efficiency:

- seamless management processes;
- progressive business systems;
- allow Campus wide information access.

LieMSIS project's scope includes 101 Lithuanian Higher education and research institutions, organizations or State Bodies.

Kaunas University of Technology has been selected as a pilot institution for LieMSIS implementation activities. There are two LieMSIS trend projects supported by the European Structural funds:

- LieMSIS academic part development and its pilot implementation;
- LieMSIS human resources development.

Lithuanian Academic Libraries Network (LABT)

The main aim of Lithuanian Academic Libraries Network (LABT, http://www.labt.lt) is to develop Information and Communication Technology based Lithuanian science and study integrated information space, combining traditional and e-libraries, e-publishing, information search and its supply to users, and providing virtual service to employees of Lithuanian science and study institutions, students, citizens, other e-systems.

Principle functions of LABT are:

- To develop and expand basic LABT infrastructure;
- To maintain and develop the Lithuanian academic e. library (eLABa, http://www.elaba.lt);
- To maintain and develop an ETD (Electronic Theses and Dissertations) database for Lithuanian Master and Doctor thesis and summaries (ETD system);
- To develop and expand Lithuanian science and academic publications database (PDB);
- To develop and expand Lithuanian science and academic e-publishing system;
- To develop and maintain the Lithuanian Virtual Library (LVB).

LABT network development is the implementation of e-publishing projects funded by EU SF:

The Highlight Results in 2005 – the first quarter of the year 2007:

- 63 Lithuanian academic institutions were supplied with equipment, necessary for e-publishing;
- eLABa specification were prepared and the prototype for e-document submission procedures to eLABa was developed;
- 30 e-publishing managers and 59 e-publishing specialists were trained and e-document submission procedures testing started.

In the first quarter of the year 2007, LABT:

- Links together 79 institutions (16 universities, the Library of Lithuanian Science Academy, 42 state scientific research institutes and 20 colleges);
- 59 libraries are automated using ALEPH system (http://aleph.library.lt);
- 54 institutions take part in the PDB system (http://pdb.library.lt);
- 14 institutions take part in the development of the ETD system (http://etd.library.lt);
- E-services are provided in LVB portal (http://www.library.lt) which is based on MetaLib and SFX systems created by Ex Libris Ltd (http://www.exlibris.co.il).

Statistics of LABT

- The processes in 59 LABT libraries (cataloguing and bibliographing, reader servicing, serial publication management, gathering, interlibrary exchange, access to the Online Public Access Catalogue (OPAC), and others) have been automated applying the ALEPH, the worldwide known software for libraries. LABT in the common network have accumulated till April 2007 over 1.55 mil. titles of publications (bibliographical records, see 3 figure) and over 4.21 mil. copies of corresponding publications (items, see 4 figure).
- 14 Lithuanian universities are taking part in the creation of ETD database and till April 2007 they have accumulated more than 4420 ETD's.

Development of Lithuanian Distance Learning Network (LieDM project)

During the implementation of the Phare project, the study "National Distance Education Network in Lithuania" and the Strategy "Development of DE network in Lithuania" were prepared. The goal of the Strategy was to prepare the guidelines for the development of a distance education network up to the year 2012. The Strategy Report includes a set of recommendations indicating actions for education leaders, teachers, learners, employers, and commercial suppliers to support the increasing and widening contributions of DL to Lithuanian society in the years ahead.

The set of recommendations covers the following issues:

- Development of DL infrastructure while emphasizing regional aspects, evaluating human resources and accumulated experience;
- Development of a legal basis for DE;
- Creation of quality assurance systems;
- Activities of DE centres seeking self-sustainability and cost-effectiveness of the Lithuanian DE network;
- Development of DL technologies;
- Administrative skills, qualification improvement and support for DL network staff and DL professionals;
- Creation of student consultation and methodological support system;
- Broadening the possibilities of applying libraries, full text document data bases and e-publishing in DE;
- Cooperation possibilities with national and international DL institutions and networks;
- Initiatives and means to attract required funds for Strategy implementation;
- Dissemination of DL among education service providers and final users through mass media;
- Monitoring of Strategy implementation.

Institutional development

At the end of 2006, LieDM consisted of 75 DL studios, centres and classrooms located at universities, colleges and vocational schools [10].

Lithuanian system for quality assuring in the field of DL should be applied to all educational sectors (primary, secondary, higher education, vocational training and adult education), at both institutional and national levels. Institutions are the main actors in the network; they influence DL development strategy and have direct contact with DL professionals and learners.

Figure 5. LieDM distance education network

However, inter-institutional competition in a small educational market restricts DL development (recognition by one institution of the courses delivered by another, joint degree programmes, etc.) DL developers need encouragement for collaboration.

It is really interesting to notice the progression of growth of LieDM video conferencing studios, distance classes, as well the rise of production and offer of DL services in the country over the past years. A huge increase in new service development can be noted in the year 2004 – 2006, especially with the advent of European funds for DL infrastructure development and training.

Integral Development of Lithuania Distance Education System Operability

Since 2005, the European Social Fund project "Integral Development of Lithuania Distance Education System Operability" (project No. ESF/2004/2.4.0-K02-VS-01/SUT-219) is being implemented by Kaunas University of Technology [11]. The main goal of the project is to create the conditions for Lithuanian scientific and education institutions to implement distance studies in all Lithuanian regions by decreasing the divide between the cities and rural areas covering all social classes and ensuring lifelong learning while creating the dynamic information society.

During the project, the following activities will be performed and the results achieved:

- competences among participants of Lithuanian DL network will be developed to enable them to create quality content, to use innovative learning methods and forms, and to organise efficient DL processes;
- DL quality assurance model will be developed;
- analytical monitoring system of Lithuanian distance education will be established;
- information dissemination system providing information on DL services and lifelong learning possibilities will be implemented.

How beneficial LieDM is for educators and trainers (T&T)

The development of DL infrastructure lead to the increased necessity of teacher and trainer training in the country, and though it was implemented during the past decades, the shift in methodology of training was very important. LieDM network became even more important in the development of this educator-training methodology, as it allowed new ideas to be implemented on the basis of research run by institutions of higher education – the leading members of the LieDM network.

Thus LieDM provided the following beneficial aspects in educator-training:

- T&T benefit from the research performed by HE institutions in new pedagogical models and practices;
- LieDM network infrastructure provides possibility to receive the same quality training content for T&T all over the country;
- institutions and T&T use the same tools and resources for DL design and delivery;
- Different types of resources and funding allows the development of competence based training for T&T enabling them to move between different sectors of education;
- LieDM DL course catalogue and monitoring and information system allows education institutions and their teachers to follow best practice examples and pedagogical experiences to be used in practice;
- Sharing of roles and responsibilities ensure high quality of DL services, as well as T&T performance follow up and marketing possibilities.

Educational systems in EU new members' countries have been adjusting to these changes more quickly that systems in developing countries, yet developing countries face even greater challenges.

First, they must overcome long-standing problems:

- expending coverage to achieve universal access to basic education (a necessary but insufficient first step in providing skills for the knowledge economy),
- expanding secondary and tertiary education,
- implementing institutional reforms to strengthen the linkages between formal and non-formal education and the labor market.

Second, EU new member countries need to raise the quality of education through changes to content, pedagogy, and the use of modern technologies, as well as cost-effectively expand access to post-school learning for adult learners. How developing countries respond to these challenges will affect economic growth, human capital development, and social cohesion.

Conclusions:

- The rapidly-developing infrastructure in Lithuania creates conditions for the development of Distance Education; the LieDM network covers the major part of Lithuania, and there is high potential demand for classes in remote regions which could become "agents" for this form of learning in rural areas.
- Infrastructure and resources (tools and courses) accumulated in the Higher Education sector have great potential to be exploited in the other sectors too (Adult Education, Vocational training, In-service training etc).
- The Lithuanian Distance Education Network successfully delivers e-learning courses in both synchronous and asynchronous modes. The network by itself and the tools which are used in this network are powerful resources for distance education support services in Lithuania.
- In such ways, e-learning technologies would become more dynamic and would stimulate the development of distance education and virtual university in Lithuania.
- Using information technologies of learning processes fundamentally changes the approach to organising learning processes; i.e., teaching gets ever more oriented at the student. Thereby, the shift from systemic to individual teaching is in progress.

Education and training systems play a critical role in curbing the problem of low, narrow, and inadequate skills, including by changing the nature of vocational training in secondary education, increasing the effectiveness of tertiary education, and motivating individuals and enterprises to support non-formal training.

References:

1. Adi B. Anani, A DL Program in Action, 1999 Frontiers in Education Conference, 1999. 1116. ISSN: 0190-5848 // http://fie.engrng.pitt.edu/fie99/papers/1149.pdf.

2. Education and training in Europe: diverse systems, shared goals for 2010. The work programme on the future objectives of education and training systems. European Commission. (2002).

3. White Paper on Education and Training. Teaching and learning: towards the learning society (1995).

4. The Use of ICTs in Technical and Vocational Education and Training. Analytical survey. UNESCO Institute for Information Technologies in Education (2003).

5. Information and Communication Technology in education. A Curriculum for Schools and Programme of Teacher Development, Division of Higher Education. UNESCO (2002), France.

6. D. Rutkauskiene, E. Pociute, A. Targamadze, M. Stricka. Lithuanian virtual university. Monograph. ISBN 9955-25-051-8. Kaunas. 168 p. (2006).

7. LITNET 2006 REPORT. LieDM annual conference. Vilnius (2006).

8. www.liemsis.lt

9. www.labt.lt

10. www.liedm.lt

11. www.liedm.lt/liedm2.4

TRAIN THE TRAINERS COURSES IN YEREVAN STATE UNIVERSITY USING 'MOODLE' OPEN SOURCE SOFTWARE

Tigran Zargaryan, Lusine Khachatryan
Yerevan State University
Yerevan, Armenia

From 2005 to 2007 Yerevan State University Library in partnership with Middlesex University (London), University of Hannover and German National Library of Science and Technology (TIB) was involved in the EU funded TEMPUS JEP 25008-2004 project "Building Digital Educational Services and Content Creation Centre in Yerevan State University library"

The main goals of the programme could be described as follows; Modernization of the University library network which will provide better conditions for access to library and world resources, and will contribute to information exchange.

- Development of various educational and library bibliographic databases for YSU students.
- Organisation of courses for teachers and students to increase their knowledge in computer literacy and in word processing systems.
- Introducing a virtual learning environment (VLE) in YSU .

The project staff provided comparative analyses of existing distance learning systems. Several requirements were developed for the system to be selected. Here are some of them:

- simplicity in use for administrators, teachers and students,
- an opportunity to work in a multilingual environment,
- availability of interfaces in different languages,
- ease of localization to Armenian language,
- supporting UNICODE,
- the system should be SCORM compatible,
- to have low price.

Several systems were compared: Blackboard+WebCT, Moodle, Sakai, Ilias: as a result Moodle was chosen. Moodle is a software package for producing internet-based courses and web sites. Moodle is a specialized system developed to control the educational process (Learning management system - LMS), provided freely as Open Source software (under the GNU Public License), supported by a community of developers by means of a site www.moodle.org on which there is documentation, installation package for versions, and online support for users and developers.

It is necessary to note, that our choice has been affected by the presence of a well developed community of Moodle users, and the widest opportunities for the implementation of various training functions.

It is important to note also the presence of a clear and intuitive interface that ensures from the outset that to work in this system is easy enough. For 'train the trainers' purposes, the project team has developed these courses:

- Students Manual. How to use Moodle Features
- Teachers Manual. How to create courses in the Moodle Enviroment
- "Moodle Features".

All three courses are in Armenian, and are accessible at: http://vle.lib.ysu.am/moodle.

Up to now we have organized training courses for 80 representatives from the faculties of Physics, Radiophysics, Mechanics, Computer Science and Applied Mathematics, Russian philology, Romanic-German philology, Oriental studies, Philosophy and Psychology, Sociology, Faculty of Law. The training process will be continued further, covering other interested persons

from YSU teaching staff. It is expected that the trainers so prepared will train colleagues in their faculties.

It is certainly very interesting to look at the feedback from the trainees of the first group on their participation.

1. Course content and design

1.1. Course materials were relevant for me.

1.2. Course materials were accurate.

1.3. The assignments were authentic, close to real life.

1.4. The complexity of the assignments was appropriate.

1.5. Assignments were followed by sufficient feedback.

1.6. The environment was user-friendly.

1.7. The learning environment was well-structured.

2. Course delivery process

2.1. Communication and collaboration was intensive.

2.2. Feedback from tutors to learners was sufficient

2.3. Technical support was provided relatively fast.

2.4. I did not need any technical support during the course.

2.5 Did you gain new knowledge from the course?

2.6. Was the course valuable for you?

According to the project outcomes, sixteen educators - participants of our courses, are preparing the following pilot courses:

- Modern Armenian Literature,
- Basis of Islam,
- Social work,
- History of the Armenian philosophy,
- Policy and right,
- Comparative criminal right,
- Theory of proofs in criminal proceeding action,
- Nuclear reactions in astrophysics,
- Theoretical mechanics,
- DNA-ligand interaction,
- Courses on Russian language
- Course on French language.

As a conclusion we would like to introduce our opinions on what we see could be successful uses for distance learning both for YSU and for the educational system of Armenia.

1. YSU have a branch in the city of Ijevan. Students of this campus can use the courses developed by the leading specialists of YSU. Currently YSU professors are travelling to Ijevan to give lectures.
2. YSU is has a Department of Continuous education. This department organizes additional training courses for the state agency professionals, who need retraining. All lectures are given in a traditional manner, e.g. face-to-face. Implementing distance learning will enable listeners to participate in the lectures and quizzes, without visiting YSU.
3. YSU has a Preparatory Faculty for foreign citizens. We are sure that for this category of students distance learning will be an effective learning method.
4. Armenia has a big Diaspora, and courses on Armenian language, History of Armenia will be highly welcomed by the Armenians living out of Motherland.

From the results of the surveys, discussions and an exchange of opinions with the participants we are sure that this kind of learning holds prospects for YSU.

GRID ACTIVITIES IN ARMENIA RELATED TO SCIENCE AND EDUCATION

K. Mkoyan[1], H. Astsatryan[2], V. Sahakyan[2]
[1]Yerevan Physics Institute
[2]Institute for Informatics and Automation Problems
National Academy of Sciences of Armenia
Yerevan, Armenia

Abstract:
Grid technologies are more and more used in scientific and educational environments. In this paper is given a brief introduction to Grid computing, its types and the usage of Grid technologies in context of research and education, in four Armenian leading organizations.

1. Introduction

Increasing demands of advanced scientific research can be fulfilled only by exploiting the existing computation resources in a more efficient way, by means of on-the-fly coupling and dynamic on-demand allocation of resources. Grid technology aims to provide a solution for this problem. The Grid aims at the effective harnessing of computing and data resources available worldwide and at making them seamlessly accessible as a single resource for any user on the web. The Grid is a platform heavily driven by a computer, and data-intensive scientific and industrial applications (meteorology and environment control, high energy physics, earth observations, biology and health, aeronautics, medical diagnostics, automotive, etc).

Ideally, a grid should provide full-scale integration of heterogeneous computing resources of any type: processing units, storage units, communication units, and so on. However, as the technology has not yet reached its maturity, real-world grid implementations are more specialized and generally focus on the integration of certain types of resources. As a result, nowadays we have different types of grids, which we describe as follows: **Computational grid** A computational grid is a grid that has the processing power as the main computing resource shared among its nodes. This is the most common type of grid and it has been used to perform high-performance computing to tackle processing demanding tasks. **Data grid** Just as a computational grid has the processing power as the main computing resource shared among their nodes, a data grid has the data storage capacity as its main shared resource. Such a grid can be regarded as a massive data storage system built up from portions of a large number of storage devices. **Network grid** This is known as either a network grid or a delivery grid. Such a grid has as its main purpose to provide fault-tolerant and high-performance communication services. In this sense, each grid node works as a data router between two communication points, providing data-caching and other facilities to speed up the communications between such points. In this sense, the WWW can be regarded as an embryonic communication grid [1-3].

It is a fact that computational Grids consists of various computational layers. The computational resources can be integrated within the organization, country, region, and worldwide. In this paper is given the overview of Grid activities in Armenia in context of science and education. The main interested research and educational organizations in Armenia are the National Academy of Sciences of Armenia, Yerevan Physics Institute, Yerevan State University and State Engineering University of Armenia (see fig. 1).

Fig. 1: Network Infrastructure within those organizations

2. Grid Activities in Armenia

This paragraph describes Grid activities that have been done in the above mentioned organizations.

2.1 YerPhI

The LHC [4] experiments at CERN [5] and HERA[6] experiments at DESY (Deutsches Elektronen-Synchrotron) [7] illustrates well the motivation behind the Grid technology. The LHC accelerator will start operation in 2007, and the experiments that will use it (ALICE[8], ATLAS[9], CMS[10]) will generate enormous amounts of data. The processing of this data will require large computational and storage resources and the associated human resources for operation and support. It was not considered feasible to fund all of the resources at one site, and so it was agreed that the LCG[11] computing service would be implemented as a geographically distributed Computational Data Grid. This means that the service will use computing and storage resources, installed at a large number of computing sites in many different countries, interconnected by fast networks. LCG-2 Grid middleware will hide much of the complexity of this environment from the user, giving the impression that all of these resources are available in a coherent computer centre. The LCG-2 Grid middleware comes from a number of Grid development projects, like DataGrid, DataTag, Globus[12], GriPhyN, and the EU project EGEE (Enabling Grids for E-sciencE).

The users of a Grid infrastructure are divided into Virtual Organizations (VO), abstract entities grouping users, institutions, and resources in the same administrative domain. The LCG-2 VOs correspond to real organizations or projects, such as the four LHC experiments; other VOs exist in the context of EGEE as well.

The Yerevan Physics Institute is participating in many international HEP (High Energy Physics) collaborations, like ATLAS, CMS and ALICE at CERN, H1 and HERMES [13] at DESY. YerPhI does not dispose of High Performance Computing (HPC) infrastructure but in the framework of H1 and HERMES collaboration DESY shares its Grid resources with YerPhI. The Grid facilities deployed at YerPhI will allow the physicists to start with the massive Monte Carlo production, necessary to perform the physics analysis, particularly after the end of HERA running, when the analysis will become the main goal for collaborating institutions.

To use those resources, a User Interface has been deployed at YerPhI in a manner that it uses the infrastructure at DESY to submit the job to the Grid.

In parallel, the work on the deeper integration of the Armenian specialists to the International VOs has been pursued. In order to provide national Grid users with the digital certificates, necessary for the work in Grids, a certificate issuing body, Armenian e Science Foundation Certification Authority (ArmeSFo CA) [14] was established in 2003. In the same year, ArmeSFo CA became an accredited member of the European Grid Policy Management Authority (EUGridPMA) [15], which is a part of the worldwide International Grid Trust Federation (IGTF) [16]. The activity of ArmeSFo on the introduction of Grid in YerPhI and Armenia over the period 2001-2006 has been presented at the International Conference in Dubna [17] and SEUA Annual Conference in Yerevan [18]. It began with the installation in 2001 of the Globus Grid middleware toolkits 1.1.4 and 2.0, followed with the establishment in 2002 of the first Grid node in Armenia by the installation of the site and client software of the AliEn [19], the Grid environment of the CERN ALICE experiment. This allowed the members of YerPhI/ALICE group to use the resources of ALICE VO for the Monte Carlo simulations and ALICE detector performance studies.

2.2 NAS RA

In 2004, in the Institute for Informatics and Automation Problems of the National Academy of Science of Armenia the first high Performance computing cluster in the South Caucasus region had been developed, which consists of 128 Xeon 3.06GHz (64 nodes) processors. [20,21] The nodes of the cluster are interconnected by Myrinet High bandwidth and Gigabit networks. The Myinet network is used for computation and Gigabit for task distribution and management. The cluster achieved 523.4GFlops performance by HPL (High Performance Linpack) test. Many intellectual software packages have been developed to support the advance in the field of modeling and analysis of quantum systems, signal and image processing, theory of radiation transfer, calculation of time constants for bimolecular chemical reactions, a system of

mathematically proved methods, fast algorithms and programs for solving of certain classes of problems in linear algebra, calculus, algebraic reconditibility, test-checkable design of the built-in control circuits. At the same time user friendly tools and interfaces have been developed for Armcluster. [22]

2.3 YSU, SEUA

Within the framework of State Target Programme, an experimental scientific-educational Grid infrastructure between the Institute for Informatics and Automation Problems of NAS RA, YSU and SEUA has been deployed [23]. Now within the ISTC A1451 Project entitled "Development of Scientific Computing Grid on the Base of Armcluster for South Caucasus Region", it is planned to extend the infrastructure by involving other computational resources.

3. Summary

Having this network infrastructure it is planned to create Resource Operating Centre in Armenia by means of integrating available computational and human resources in those organizations. It will allow using this infrastructure in science and education. In the near future it is planned to integrate above mentioned resources to International Grids.

References:

1. The Anatomy of the Grid- Enabling Scalable Virtual Organizations. I. Foster, C. Kesselman, S. Tuecke. *International J. Supercomputer Applications*, 15(3), 2001.
2. Computational Grids., I. Foster, C. Kesselman. *Chapter 2 of "The Grid: Blueprint for a New* Computing Infrastructure"*, Morgan-Kaufman, 1999*
3. What is the Grid? A Three Point Checklist. Ian Foster, Argonne National Laboratory & University of Chicago
4. LHC – The Large Hadron Collider *http://lhc.web.cern.ch/lhc/*
5. CERN - European Organization for Nuclear Research *http://www.cern.ch*
6. HERA Results on Physic A.F. Zarnecki Institute of Experimental Physics, Warsaw University
7. Deutsches Elektronen-Synchrotron *http://www.desy.de*
8. A Large Ion Collider Experiment (ALICE) *http://aliceinfo.cern.ch/*
9. A Toroidal LHC ApparatuS (ATLAS) *http://atlas.web.cern.ch/*
10. The Compact Muon Solenoid (CMS) *http://www-cms.desy.de/*
11. LCG - LHC Computing Grid Project *http://lcg.web.cern.ch/LCG/*
12. Globus Toolkit Version 4: Software for Service-Oriented Systems. I. Foster. IFIP International Conference on Network and Parallel Computing, Springer-Verlag LNCS 3779, pp 2-13, 2006.
13. HERMES experiment at DESY *http://www-hermes.desy.de/*
14. Armenian e-Science Foundation Certification Authority (ArmeSFo CA) – *http://www.escience.am/ca*
15. European Grid Policy Management Authority (EuGridPMA) - *http://www.eugridpma.org*
16. International Grid Trust Federation - http*://www.gridpma.org*
17. A.A Grigoryan ., A.T. Harutyunyan , A.R. Hayrapetyan . "Grid in Armenia: Present Status and Perspectives", Proceedings of the International Conference "Distributed Computing and Grid Technologies in Science and Education", 2004 29 June – 2 July, Dubna, Russia
18. A. A. Grigoryan et all, "Armenian e-Science Foundation: Goals Achievements, Projects", Proceedings of SEUA Annual Conference, 2005 October 24 - 28, Yerevan, Armenia.
19. ALICE Environment on the Grid AliEn - *http://alien.cern.ch*
20. H. Astsatryan, V.Karamov, V.Sahakyan, Yu. Shoukourian, Development of Grid-segment based on Armcluster, YSU and SEUA Clusters, Proceedings of the Fifth International Conference on Computer Science and Information Technologies (CSIT '2005), ISBN: 5-8080-0631-7, pp. 363-366, September 19-23, 2005, Yerevan, Armenia
21. H.V. Astsatryan, Yu. Shoukourian, V. Sahakyan, The ArmCluster Project: Brief Introduction, Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA '2004), Volume III, ISBN: 1-932415-25-4, pp. 1291-1295, CSREA Press, June 21-24, 2004, Las Vegas, Nevada, USA
22. H.V. Astsatryan, Yu. Shoukourian, V. Sahakyan, Creation of High-Performance Computation Cluster and DataBases in Armenia, Proceedings of the Second International Conference on Parallel Computations

and Control Problems (PACO '2004), ISBN: 5-201-14974-X, pp. 466-470, October 4-6, Moscow, Russia
23. H. Astsatryan, T.Grigoryan, M. Gyurjyan, V. Sahakyan, Yu. Shoukourian, Development of Web Environment for Efficient Exploitation of Linux Cluster Computing Resources, International Conference VECPAR'2006, Rio, Brazil

DIGITAL LIBRARY. BUILDING, IMPLEMENTATION, PROSPECTS

Beniamin Janpoladyan, Hrayr Grigoryan, Aram Kalantaryan
State Engineering University of Armenia
Yerevan, Armenia

Abstract:

To provide greater quality and efficiency to the instruction offered at the State Engineering University of Armenia and its campuses as a component part of currently implemented university modernization programme a special digital (electronic, virtual) library with its infrastructural facilities and organizational components has been built at University. The accomplishments of this deal include the creation of technological and teaching infrastructure with its library server, e-library classrooms and distributed facilities of user access, development of library management software products, and establishing users training and electronic resources preparation systems with their courseware and organizational tools to facilitate these.

The activities aimed at and the implementation of library systems assumed options varying in costs, technologies, time, specialists involved, as well as in policies and the organizational model applied. Being restricted in funding a special strategy characterized by low expenditure coupled with extensive work in software and courseware development areas has been applied. This has incurred the building of a system which combines low cost maintenance with high technological skill demands to the users – students, staff, and courseware developers.

The digital library developed at SEUA is based on the principles of standardization, universality, and openness, which imply the usage of software development standard products, the possibility to use a multitude of instruments of instruction technologies including electronic textbooks, knowledge assessment tests, virtual laboratories, packages, to implement teaching different models including internal, evening class,, correspondence course, and distance learning, as well as free access of users to electronic resources.

The implementation of these strategies and principles has resulted in the creation and development of:

- Library management software product. The product provides functioning of digital library, friendly user interface, multi-media electronic resources usage possibility, as well as resources control means. The product has been developed by using open source products and as such is public domain.

- Library distributed infrastructure. Special library computerized classrooms with access to Internet/Intranet have been created at the Library of the University. University computers including those in computer classrooms have access to the Internet/Intranet. These measures coupled with the opportunity for outside access provide multiple accesses to electronic resources with round the clock availability from any location;

- Faculty members preparation system. The main burden and responsibilities in electronic resources preparation and acquisition is placed on the faculty members. A special courseware has been developed and special courses have been organized to prepare faculty members for multi-media resources preparation and acquisition. Multilevel preparation approach is applied which provides skills acquisition in range from computer literacy to the level of multimedia content developers.

The experience gained through the Digital Library building and implementation as well as its comparison with traditional libraries has shown that the chosen model, being at the building stage rather time- and cost-consuming and technologically complex later on provides such substantial advantages as:

- potential to acquire and store much more information, provide preservation and conservation for lesser fee and negligible space and without new staff involvement as electronic resources are mainly getting as public domain and self-generated content, are preserved in computers and an exact copy of the original can be made any number of times without any degradation in quality;

- better accessibility to resources due to the Internet 24/7 free access possibility;

- better quality of library services due to the information computerized search and retrieval possibility;

- greater quality of teaching materials due to the usage of multimedia format and networking based on the hypertext links to any other resources of other digital libraries.

As a final remark, it could be stated that the implemented solution provides a much lower cost of library maintaining, higher efficiency of services and better quality of teaching materials.

DEVELOPMENT OF ARMENIAN HIGH SPEED RESEARCH AND EDUCATION INTERCONNECTION NETWORK

[1]Yuri Shoukuryan, [1]Vladimir Sahakyan, [2]Igor Mkrtumyan, [1]Arthur Petrosyan, [1]Robert Tadevosyan, [1]Tigran Zargaryan
[1]National Academy of Sciences of Armenia (NAS RA)
[2]Internet Society - Armenia (ISOC AM)
Yerevan, Armenia

Abstract:
The article describes the initiative for creation of reliable and high-speed interconnection between currently existing Scientific, Research and Educational Networks in Armenia.
Today there are several loosely connected or unconnected research and education networks (ASNET-AM, ARENA, University network, Library network and Industry research networks) that were developed separately. It is obvious that in order to provide the exchange of scientific information and provide scientists and researchers with the fast access to the databases, videoconferencing, tele-working it is necessary to have modern high-speed infrastructure connecting all NRENs into a single network.
There is the need for coordinated and integrated network security management policy and implementation of regional research and educational high-speed backbone infrastructure to ensure flexible but secure data exchange. A research and education network requires a low latency network with the speed up to 10Gbps. This will facilitate the use of advanced applications, such as videoconferencing and distance learning, between institutions and research communities to improve learning.
Thus it is currently planned to implement an Armenian high-speed interconnection network to be used as a main 10G backbone for all major Scientific, Research and Educational institutions of Armenia, with future connection to pan-european research-education network (GÉANT2).

Introduction

In this age of information technology, effective Information and Communication Technologies (ICT) infrastructure and high-speed network connection to the outside world is vital especially for developing countries like Armenia. ICT development today has demonstrated the huge potential and strength of ICT through the already existing global networking such as Internet, which currently serves as a great aid for knowledge and resource sharing. There are also many other examples such as online video conferencing, tele-medicine, distance learning, e-business, online environment monitoring system, early warning system for disaster mitigation, etc. which have been successfully implemented in various parts of the world. Thus advanced development in ICT provides great opportunities for Armenia also, to have an access to the same scientific and research resources and knowledge sharing capabilities as the developed world has.

Although the development of the ICT sector is recognized as important in Armenia, there is still lack of unified and integrated scientific, research and education infrastructure. Yet little has been done to establish a modern research network infrastructure for science and education in Armenia.

Current situation with Scientific Research and Education Networks in Armenia

Today in Armenia there are several loosely connected or not connected research and education networks, that were created and developed separately:

1. **ASNET-AM** Academic Scientific Research Computer Network of Armenia, which unifies Academic, Scientific, Research, Educational, Cultural and other organizations, which are engaged in scientific and educational activity. ASNET-AM unites scientists, scientific and technical associates, post-graduates, students and other users from more than 50 scientific, research, educational, cultural and other organisations.
2. **ARENA** foundation acting as a satellite Internet access provider under Virtual Silk Highway (SILK) Project.
   ARENA foundation member organizations are:
   a) National Academy of Sciences of the Republic of Armenia (NAS RA)
   b) Yerevan State University (YSU)

c) State Engineering University of Armenia (SEUA)
d) Yerevan State Medical University (YSMU)
e) Yerevan Physics Institute (YerPhI)
f) Yerevan Research Institute of the Automation Control Systems (YerRIACS)

3. **University network**
   This is yet a virtual network not having common management and is a collection of separate university networks. Major universities (YSU, SEUA, YSMU) are already interconnected. A new project financed by NATO, UNDP and OSI will interconnect more than 30 state and private educational institutions of Armenia by fibre-optic. The final connectivity between the nodes is not fixed yet
4. **Library network**
   It includes major Yerevan libraries linked by fibre-optic cable. General management of the network is done by Armenian Libraries Consortium
5. **Industry research networks** (YerPhi, Atomic energy institute, Laser technology institute, etc).
   They are separate networks not having common management

The above mentioned networks basically have no regular and high-speed interconnections. The interconnection types are: leased lines, (own and leased) optical fibres and wireless connections. For leased lines networks the capacity is not more than 10 Mbit/s for fibre optic or 5Mbit/s for wireless connections.

It is obvious that in order to provide the exchange of scientific information, to provide scientists and researchers the fast access to databases, videoconferencing, tele-working it is necessary to have modern high-speed infrastructure connecting all research and education networks into a single network.

New initiative

This paper describes a new initiative to implement an Armenian high-speed interconnection network to be used as a main 10G backbone for all Armenian National Research and Education Networks (AM NREN), with future connection to pan-european research-education network (GÉANT2). The initiative was introduced by the working group: Yuri Shoukourian (Vice President of NAS RA), Vladimir Sahakyan (Director of IIAP NAS RA), Igor Mkrtumyan (President of ISOC-AM), Tigran Zargaryan (technical director of Armenian Library Consortia) Arthur Petrosyan (Systems Manager of ASNET-AM), Robert Tadevosyan (Communications Manager of ASNET-AM). The working group initiated discussions for the founding of the **Consortium of Armenian National Research and Education Networks (CAMNREN).** According to preliminary discussions CAMNREN would include the major constituents of the Armenian NREN: ASNET-AM, ARENA, University network, Library network, Industry research network, ISOC-AM (which acts as NGO of local Internet community and currently supports Armenian Freenet network).

One of the purposes of having such a high-speed backbone is the need for effective scientific and statistic calculations. At present, there is rapid development in the field of scientific calculation, as parallel computers (clusters) are increasingly used. On these computers complicated calculations can be executed in ultra-short time, since their architecture supports many parallel calculations at the same time. Clustering technology is used mainly for scientific purposes and technical research but is also gaining ground in the area of medicine, biology, chemistry, and statistics. The largest cluster in the Caucasus region (ArmCluster, www.cluster.am) is currently installed and running in the Institute for Informatics and Automation Problems (IIAP) of the National Academy of Sciences of Armenia (NAS RA). However this clustering service has a limited use by universities and other research institutions because of problems with reliable and fast network access.

Effective GRID infrastructure implementation in Armenia is the next purpose of high-speed network connection between research and educational organizations of Armenia. An

experimental scientific-educational Grid segment is already installed in IIAP NAS RA, YSU and SEUA. Ongoing ISTC Project (A1451) - "Development of Scientific Computing Grid on the Base of Armcluster for South Caucasus Region" involves more computational resources in Armenia and will create virtual Grid middlewares in the field of physics (quantum, astrophysics), biology, etc. And again all this requires reliable and fast interconnection.

Another usage of the proposed high-speed backbone is introduction of advanced network applications, such as videoconferencing, distance learning and online teaching, between universities, institutions and research communities of Armenia to overcome the barriers of time and space in teaching and learning.

It is obvious therefore that AM NREN requires a low latency network with the speed up to 10Gbps backbone. There is also the need for coordinated and integrated network security management policy to ensure flexible but secure data exchange.

The planned AM NREN high-speed interconnection network, with connection to GÉANT2 is presented below:

The above structure is planned to be implemented by NATO Networking Infrastructure Grant project. The result would be 4 points of presence (POP) in Yerevan with Cisco Catalyst 6500 Series 10Gbps capable switches installed and interconnected. It is planned to lay 16-wire fibre- optic cable through the Yerevan city metro tunnels and stations. It is planned to have POPs in the M.Baghramian, Eritasardakan, Republic Square and G. Nzhdeh (Railway terminal) metro stations. It will be a dark cable. Then fibre-optic cables will be passed from POPs to the point of connections of all NRENs participating in the project and provide the equipment for the POPs.

Intercity and International connections

International connection of separate networks listed above is currently provided by satellite antennas of ARENA and NAS RA as well as channels rented from the commercial providers. Today as the monopoly of Armentel in international communications is relinquished and the prices are expected to go down it would be possible to rent more Internet bandwidth for NRENs through the fibre- optic channels. However real integration with the outside world for AM NREN would be connection to the European research and education network (GEANT2). This work is already in process by several projects, such as Porta Optica (www.porta-optica.org) and Black Sea Interconnection Initiative. Only a high-speed connection will permit Armenia to participate in the European science programs and effectively collaborate with European research centers. Mentioned projects are expected to provide the following intercity and international connectivity in the near future.

APPLICATION OF FUZZY THEORY IN ADAPTIVE ELECTRONIC LEARNING SYSTEMS

Siranush Sargsyan, Anna Hovakimyan, Arpine Gyurjinyan, Sergey Barkhudaryan
Yerevan State University
Yerevan, Armenia

The systems of electronic learning for some disciplines are applied by the user during the organization of the learning process. In these systems, the main ways to organize the learning process are the learning material and the course examination and evaluation mechanisms.

To managing the learning process means the following: to put the learning materials and **accompanied elements** at the user's disposal in accordance with the terms and condition defined in advance. These terms and conditions define the scenarios of the learning process. The suggested scenarios in adaptive learning are usually built taking into account the knowledge of the student that he has at the moment and his characteristics related with his physiological type. There is a natural problem to organize the learning process with the scenario adapted to the student; it means to adapt the scenario of the learning process to the student. It has an objective to make the learning process as effective as it is possible.

The FUZZY theory [1,2] has been applied to establish the adaptive electronic learning system FUZZY; in this system the characteristics of student are the following

- the human type of the student - HT, choleric, melancholic, sanguine, phlegmatic
- the gifted coefficient of the student GC
- the subject knowledge of the student SKn
- the age of the student.

With the help of the ArmALFS (Armenian Adaptive Learning Fuzzy System), the adaptive learning process of the student is organized. The main modules are - UI (User Interface), Testing, HT, GC, SKn, Age. The following actions are realized in the modules:

1. User Interface (UI) - here the user inserts his/her personal data (user name, password, age, bloc reflecting the test results).
2. Testing - here the testing blocks sorted by different objectives, allow the students to participate in the testing process, consisting of.
   Human type testing (HTT)
   Gifted Coefficient Testing (GCT)
   Subject Knowledge Testing (SKnT)
3. In the module HT by using the information obtained as a consequence of the work of the module HTT, the solution of the problem is achieved.
   Here are elaborated the logical rules which assure the generation of the adaptive scenario. For the generation of the adaptive scenario there are defined the linguistic terms, linguistic multitudes, rules of calculation for the learning materials, the accompanied elements of multimedia, exercises, tests.

The Theory FUZZY makes more flexible the works of the blocks HT, GC, Age, because in the systems elaborated by us up to now for the formation of multitude of the descriptive attributes, there are taking into account the precise answers: 0 or 1, and undoubtedly it don't represent the real situation [3].

The adaptive learning system ArmALFS elaborated under the notions of FUZZY system is in its primary phase, and the initial results exceeded our expectations.

References:

1. Chin-Teng Lin and Ya-Ching Lu,"Systems, Man and Cybernetics, Part B, A neural fuzzy system with fuzzy supervised learning," In IEEE Transactions on Volume 26, Issue 5, pp.744 – 763, Oct. 1996.

2. Ramot.D, Friedman.M ,Langholz.G and Kandel.A," Complex fuzzy logic," In IEEE Transactions on Fuzzy Systems, Vol. 11, Issue 4, pp.450 – 461,2003.
3. Yih-Jen Horng, Shyi-Ming Chen, Yu-Chuan Chang and Chia-Hoang Lee," A new method for fuzzy information retrieval based on fuzzy hierarchical clustering and fuzzy inference techniques, "In IEEE Transactions on Fuzzy Systems, Vol.13, Issue 2, pp.216 – 228, April 2005

THE ROLE OF MODERN TECHNOLOGIES IN TEACHING OF PEDIATRICS: CURRENT ISSUES, SUCCESS AND DIFFICULTIES

Ruzan Petrosyan MD, PhD
Associated Professor of Pediatrics
Chair of pediatrics and pediatric surgery No2
"Mkhitar Heratsi" Yerevan State Medical University
Yerevan, Armenia

The usage of modern computer technologies and e-resourses in the education of medical doctors is becoming a life important process because of a rapidly developing medical science.
The aim of this work is to introduce how modern techniques and electronic facilities are being used in the teaching of pediatrics in Mkhitar Heratsi YSMU.

- The Chair of pediatrics of YSMU organizes ***lectures and practical classes*** by computers (using Powerpoint) and LCD projectors, which facilitates the visualization of teaching material and comprehension (see picture 1).
- Professors use electronic sources such as ***PubMed, OMIM, NHI*** library, ***Medline, Armenian Medical library e-resources, Yahoo, Google*** and others to update topics for lectures and seminars.
- Searching for new books and medical journals in ***Internet shops*** helps to be on course to receive the majority of medical news.

Picture 1. The hemopoesis in slides.

Listening and watching CDs and videos is an additional way to bed-side teaching.

- "Examining the child"
- "Respiratory system disease"
- "Heart auscultation" (3M Health Care)
- "Atopic dermatitis" (American Academy of dermatology, July 29, 2001, Anaheim, California)
- Integrated Management of childhood diseases

Computer programs are also used for diagnosing rare diseases.
For example: ***"Oxford Dysmorphology and Metabolic database"*** we use to find a genetic disorder in a child with malformations.
Computer technologies are used also in the laboratory service. Thus the genetic program ***"Caryotype"*** is used in the detection of chromosomal disorders, such as, deletions, translocations and others (see Picture 2).
Moreover, the Internet creates a collaborative linkage between laboratories, hospitals and doctors spreading an atmosphere of collaboration, healthy competition and an experience resulting in improved pediatrics service of the country. We can share the results of some examinations to discuss the changes for example in the CT picture (see Picture 3).

Picture 2. The caryotype of the person R.

Picture 3. CT of a patient N. with dermatomyositis

Tandem Mass Spectrometry and Gaze Liquid Chromatography. with computerized work up of values obtained are used in genetic biochemistry lab (see Picture 4).

Picture 4. Tandem-mass spectrometry results of a patient L. with propionoc aciduria.

Gaze – Liquid chromatography is used in detection of some aminoacidopathies. (see picture 5).

Picture 5. Normal picture of computerized counting of blood aminoacid values.

Our research programs are based on the modern ways of biostatic analyses such as SPSS which is great help in evaluation of data obtainedTesting of students knowledge during seminars and exams is a part of the credit system. The bank of training tests has been developed and is used for the current learning process of studying. Here is an example of Multiple Choice questions used in the training of students. We also mention the literature used to make such tests.

11. Child is 5 years old male. His body weight is 17 kg. Is this child in the normal age range?
a. Yes, the child is within the normal range of development
B.No child is not within the normal range of development
The correct answer is a. Explanation: The child is in a normal age range because his physical parameters correspond to the percentile normal values for 5 years. See percentile charts in the basics of Pediatrics, page 21.

12. The birth weight of the female child is 2.800 kg. Her age now is 6 month and the body weight is 7.200 kg. Evaluate his physical growth
a. Yes, the child is within the normal range of development
B.No child is not within the normal range of development
The correct answer is a
Explanation: the child is well developed because her physical parameter corresponds to the age related values represented in the percentile charts in the basics of Pediatrics, page 22.

13. Head circumference by the age of 6 month in girls is
a.40 cm
b.46 cm
c.44,5 cm
d. 60 cm
The correct answer is c.
Explanation: See percentile charts in the basics of Pediatrics, page 27.

Monitoring of a child's condition cannot be done without modern technique. On picture 6 you can see the neonate under the multiple control of his heart rate, respiratory rate, pulse oxygen saturation, daily urine output.

Picture 6. Neonatal ICU of University clinic No3. Dr. Ruzan Petrosyan and her first year resident. Case discussion, bed-side teaching.

Thus we can say that

- Usage of a new electronic facilities and resources improves the quality of teaching of medical subjects resulting in the better training of future doctors for Armenia and for many countries abroad.
- Internet makes a linkage between hospital and laboratories all over the world, which is first of all beneficial for our little patients.
- Modern technologies also contribute to the development of medical science in Armenia.

EDUCATIONAL MATERIALS BASED ON MULTIMEDIA TOOLS

B.Sukhbaatar, G.Ganchimeg, E.Narantuya
Institute of Telecommunication and Information Technology
Mongolian University of Science and Technology
Ulaanbaatar, Mongolia

ABSTRACT
The e-book can inherently contain text, image, voice and video materials – multimedia information. Therefore, if someone wants to produce an e-book, especially in the engineering field where some laboratory experiments are usually required, it would be advised to fully use the multimedia features of e-books.
A multimedia presentation which contained and incorporated text, image, voice and video materials will be valuable material for the distance learning students who can feel like a participant of a live lecture.
An example of multimedia presentation is "VIRTUAL MUSEUM" that we have developed for the museum visitors. The subject oriented multimedia e-library has been developed under the name "Цахим Номын Сан" which means electronic library in Mongolian language. The subject is Mongolian Literature.

1. Multimedia E-books for distant learning students in engineering field

In engineering studies e-books can be of more use than paper based books.. E-books inherently can contain text, image, voice and video materials – multimedia information. Such an e-book is most useful for distance learning students in the engineering field. If someone wants to produce e-books, especially in the engineering field where some laboratory experiments are usually needed, it would be advised to fully use the multimedia features of e-books. The paper based book does not have such advantages.

As I am teaching at the University, I always deal with such education elements as textbooks, lectures, seminars and laboratory research, which enables students to develop their interests and skills. Therefore, any new model of teaching should take into account all these four elements i.e. availability of textbooks, participation in lectures and seminars, and access to laboratory research.

Nowadays, a development of ICT has facilitated the introduction of all the above four education elements into the model of distance studies. These four elements require multimedia handling of information: text, image, voice and video.

We are going to prepare e-books as didactic materials for the M.Sc students first, for example, e-books for courses Fundamentals of Electrical Circuits, Software Engineering and Fundamentals of Artificial Intelligence.

Our University is going to start a two-year distance studies for master's degree via the Internet. Professors of the Mongolian University of Science and Technology are going to work on a new model of academic e-materials or e-books which will be specially designed for distance studies.

The structure of e-books seems to have at least four levels and then each level can be divided into parts: General level> Chapters> Learning units> Segments…

All levels and parts will be prepared by using text, image, audio and video clips.

For example, the first level (General level) of the e-book may contain the following parts: "Author's note", "Examination requirements", "How to use an e-book", "Learning Units", "Course in pdf format", "Appendices" and "Auxiliary software". The first level also includes the most important element: a table of contents of a course. Each title gives access to the material included in the textbook.

The Learning Units may be grouped into "Chapters". Students are automatically directed to the "Introduction" unit, a key element of the lecture that contains: the objectives - precisely explained aims and requirements that students are expected to know after finishing a given Learning Unit, initial requirements is what needs to be known to understand a given Learning Unit, and others.

The "Lecture" is the most important part of an e-book. It constitutes a basic element of the Lesson Unit. The lecture is usually long and it covers about 20 to 30 screens. Therefore, it is

advisable to divide a lecture into several segments. During studies students will often come back and revise the material included in the main lecture.

Audio comments may have the most commonly used tool of the textbook. In the introductory lecture audio comments can be used to describe various ways of application of the technology. While listening to audio comments, the student can follow instructions presented on the screen of the computer. Audio comments are not read but should be presented in the form of a lecture. Thus a student can feel like a participant of a live lecture.

A Powerpoint presentation with audio comments requires a lot of work and effort in their preparation. Animated presentations accompanied by a lecturer's comments constitute a valuable didactic element of e-books. Lectures incorporating illustrations, simulations or graphic presentations will also constitute a valuable tool that enables students to understand a new material and to put into practice theoretical assumptions. The availability of tests makes it possible to evaluate ones own progress and level of subject command.

An e-book is a new product of the multimedia technology. The new model of a textbook was proposed for distance learning students in order to replace both a traditional printed textbook and a lecture.

In an attempt to foresee the future developments of the e-book technology the following points may be taken into account:

- In a short time lecturers will be offered new tools that will enable them to create Learning Units containing simulated experiments and to conduct live experiments via the Internet;
- Cheaper and more common DVD production will enable them to store much more information and didactic materials on a single disc.
- Development of a student portable e-library which may contain the above mentioned multimedia e-books and other necessary applications as well.

2. **Multimedia presentation**

A presentation which contained text, image, voice and video materials will be valuable material for distance learning students. We can refer to it as aultimedia presentation. Studentscan feel like a participant of a live lecture.

Animated presentations accompanied by a lecturer's comments constitute a valuable didactic element of lessons. Lectures incorporating illustrations, simulations or graphic presentations will also constitute a valuable tool that enables students to understand a new material and to put into practice theoretical assumptions.

An example of multimedia presentation is "VIRTUAL MUSEUM" that we have developed for the museum visitors. Some fragments of the Multimedia presentation "VIRTUAL MUSEUM" are shown in Fig.1. The Mongolian government has declared 2006 as the 800^{th} anniversary of the Great Mongolian State, and on this occasion we worked to develop the Mongolian State Historical Virtual Museum. Establishing Virtual Museum is a valuable contribution in advertising our national and government history to the World and inheriting them for our new generation.

Most historical evidence cannot be saved in original forms, some of them kept in foreign country's museums and archives. Therefore, it is impossible to make a complete historical museum with only original exhibits. However, in the virtual environment it is possible to restore and renovate the exhibits.

Fig.1. Some fragments of the Multimedia presentation "VIRTUAL MUSEUM"

Therefore, the most appropriate solution to establishing the Mongolian State Historical Virtual Museum is to complete the museum with original exhibits as much as is possible and to complete missing parts by creating virtual forms.

One of the most important parts of the Virtual Museum is the electronic information system, which includes hypotheses and conclusions of scientists concerning the exhibits, which are impossible to show in the original view.

Mongolian Government has issued an order to establish Mongolian State Historical Virtual Museum.

For the development of this project, we have used following software packages:

- Photoshop cs8.0
- Illustrator cs12.0
- Corel Draw 12.0
- Macromedia Flash 8.0
- Microsoft office 2003
- Flash Decompiler 2.0
- Sound Forge 8.0

Powerpoint presentations with multimedia comments require a lot of work and effort in their preparation.

3. Multimedia e-library

As an example of subject oriented multimedia, an e-library has been developed under the name "Цахим Номын Сан" (Tsahim Nomyn San) which means 'electronic library' in Mongolian language. The subject is Mongolian Literature. It is available in the form of a CD and distributed to the libraries of the Universities and Colleges of Mongolia. It contains novels and poems of famous writers of Mongolia in multimedia form i.e. some books have audio and video support. We can read books not only in PDF text format, but also can hear it by simple clicking. Some fragments of the Multimedia E-library "Цахим Номын Сан" are shown in Fig.2.

Fig.2. Some fragments of the Multimedia E-library "Цахим Номын Сан"

CONCLUSION

- University education always deals with such education elements as textbooks, lectures, seminars and laboratory research, which enable students to develop their interests and skills. Therefore, any new model of teaching should take into account all these four elements i.e. availability of textbooks, participation in lectures and seminars, and access to laboratory research. For this purpose e-books can help much as it can contain inherently text, image, voice and video materials – multimedia information. Such e-books are most useful for the distance learning students in the engineering field.
- A multimedia presentation which contained and incorporated with text, image, voice and video materials will be valuable material for the distance learning students who can feel like a participant of a live lecture. We have developed a multimedia presentation called "VIRTUAL MUSEUM" which can be an example of how to produce multimedia presentations.
- The subject oriented multimedia e-library has been developed under the name "Цахим Номын Сан" which means electronic library in Mongolian language. It can also serve as an example for the development of subject oriented multimedia e-library.
- More detailed results of this paper will be presented in the International Conference on ICT which will be organized in Ulaanbaatar, Mongolia, October 1-3, 2007
- All the above mentioned developments are now in the initial stage. A lot of work has to be done in future for the final products. We need joint cooperation in this field with related organizations, interested parties and Universities.

MATHEMATICAL MODELS OF INTELLECTUAL SEARCH IN TEXTS ON NATURAL LANGUAGE

E.N.Manukyan, S.N.Manukyan, G.A.Nazaryan
State Engineering University of Armenia
Yerevan, Armenia

Information-retrieval systems date back to the 1960's. The main requirement of such systems is quick provision of the precise answer, which must be adequate to the user's inquiry. However, existing volumes of textual information (including hypertext) in the electronic form and tendencies for constant growth of the capacities are making the realization of this requirement extremely difficult. This leads to the need to develop algorithms, which obviate the need for the intervention of the specialist in the information search phase , and in the meaningful classification of that information. Traditional methods of information retrieval by keywords do not in most cases result in the selection of the sought texts and the elimination of unwanted data. The reason is that the criterion for information selection is usage of not effective simple words, included in the search expression. There are systems, which are automating the process of iterated filtration of the information, which is at the preliminarily stage selected with the help of classical methods [1-6]. Unfortunately, available results are not satisfactory. As one of the possible solutions of the problem we are suggesting a three-layer system of retrieval. At the first layer the classical methods of information retrieval are used, and we receive a set of suggestions, which are as much as possible correlated with the keywords from the search expression. At the second layer, each of the received suggestions is being replaced by the concepts, representing word offerings. The search expression also passes analogical transformation. Such a presentation allows the use as keyword information, not only each of given words in accordance with their concepts, but also their classes and linked with them other concepts from the system database. As a result of such filtration suggestions remain, which have the closest semantic relation with the search inquiry. The last layer represents the system of intellectual search, which synthesizes the direct answer to the user's request from the information database, generated in accordance with the results of the previous two phases.

In this article we describe the basics of intellectual search and the problems connected with organizing the work of the system.

In the system the text analyzer is used, which converts the input sentence into the semantic tree, reflecting the meaning. The words from the sentence representing the concept, act as the nodes of the tree, and the links between the nodes are acting as semantic-meaning relations between the concepts.

The executive part of the system consists of the following operations chain.

1. Some text (sentence) is given to the input of the analyzer, and the tree is generated describing this inquiry. Analysis of the received tree is done. The graph of the search sentence consists of interrogative pronoun, pointing to the required text. Remaining nodes of the interrogative pronoun graph will serve as keywords in the search process to the request for the concrete request.
2. In the previously selected text, the database transformation of the sentences to the graphs is done. The set of the graphs we will call SGSS (Set of Graphs with the Source Sentences).
3. If it is assumed that in the selected text database the sentence containing immediate and full answer to the request is present, then the search is results in the SGSS graph, containing the full graph of the inquiry text.
4. When such a graph is detected, from that graph the node with its subtree corresponding to the interrogative pronoun is chosen. That node with its relevant subtree is the answer to the request.
5. Selected subtrees are converted to the text, which is the answer to the request.

The scheme described below, is a simplified version of solving the problem. In fact, the probability is very low that the semantic tree of the request will be contained in the SGSS trees. However, SGSS could contain information required by the request text. This is the result of the fact that some relations between the concepts as a rule have other equivalents to the relations. It is possible, that relations between the 2 nodes are described by the equivalent relation with the 3 node type. In this connection let us to examine several semantically mutually equivalent text fragments.

шапка мужчины – мужчина в шапке – мужчина имеет шапку.

If we are converting this fragment into the trees, then in all three trees for the concepts "мужчина" and "шапка" the same semantic relation is present, though the semantic relations between the concepts are different. Differences are present in relation types as well as in their dimensions. This is the explanation of the fact, that despite the constructive and parametrical differences between the trees of the interrogative sentence and alleged sentences-answers, based on all three fragments, we can receive monosemantic (one-to-one) answer to the question: : «**Что имеет мужчина?».**

From the above example it is clear that the inquiry text graph as a preliminary step is a necessary analysis for defining semantically equivalent trees. And only after this it is necessary to organize in the SGSS the search of the inquiry trees, and also preliminary defined semantically equivalent trees. This methodology assumes that for the system the database of concepts and relations is available. It is obvious that the efficiency of the system working is in proportion to the fullness of the database.

For effective completion of the search process as described we are suggesting a method of representing the sentence tree and the search method.

Let us consider the thread $T_{ij.}$,

$$T_{ij} = \{w_i; r_{ij}; w_j\}$$

where: w_i and w_j are the **i** -th and **j-**th words of the sentence, and

r_{ij} is the syntactic relation between the words w_i and w_j**.**

In the sentences tree each of the triad members has its semantic analogue, in the form of the triad:

$$ST_{ij} = \{c_i; sr_{ij}; c_j\},$$

where: c_i and c_j – are the concepts, in due order with the words w_i and w_j , and

sr_{ij} – semantic relation between the words corresponding with the relation r_{ij} .

Let us to examine the set MST, where the elements are triads with the ST_{ij} type. This set has one important characteristic. Any 2 elements $\mathbf{[ST_{ij}]_p}$ and $\mathbf{[ST_{ij}]_q}$, from the set ST_{ij} contain concepts c_p and c_q , which can always be connected with each other a unique way. The way is defined in the form of consistency $\mathbf{ST_{ij}}$, where the last component from the triple (c_j) of each $[ST_{ij}]_k$ element coincides with the first component (c_p), of the next $[ST_{pq}]_{k+1}$ element $(c_j \equiv c_p)$.

Assertion. If in accordance with the above mentioned rules, for any sentence set **MST** is formulated, then this set can figure as a semantic analogue of that sentence.

Proof. Let us choose two arbitrary straights between any pairs of the concepts. Let us to assume that defined sets of concepts exist, which are common for both straights. If from this common set of concepts in a random way we will select two concepts c_p and c_q , then according to the characteristics of the set **MST** in respect of the uniqueness of the way he elements of that set are connected, a unique way connecting the concepts exists between the pairs of the concepts. It follows that after building all possible ways between the concepts of the set MST, we will have fixed graph not containing cycles.

In the case of the presence of the set MST_q for the interrogative sentence and the set MST_s, representing the sentence from the source on which the search is being organized, search

of the graph of the interrogative sentence acting as a sub graph of the sentence results in the definition of inclusion of the one set into the other.

$$MST_q \subseteq MST_s \quad (1)$$

In the case of MST being present, a search could be organized in this order.

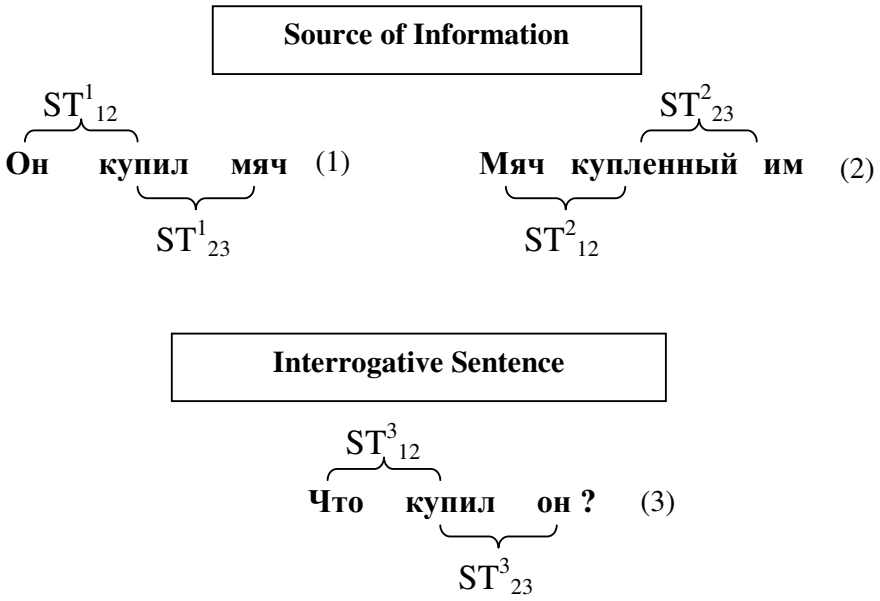
- ◊ To formulate the set MST_q for the interrogative sentence.
- ◊ Based on the relations database, to formulate all the possible equivalent elements MST_q in the form of $[MST_q]_i$.
- ◊ For all the sentences form the source of information to formulate the corresponding sets MST_s.
- ◊ For each MST_s check, is any of $[MST_q]_i$ its subset.

$$\left(\underset{i}{V} \left([MST_q]_i \subseteq [MST_s]_j \right) \right)_j \quad (1)$$

- ◊ In each coincidence, it is necessary to extract a concept from the $[MST_s]_i$ corresponding to the interrogative pronoun or a subtree hanging from it.

From the point of view of the practical implementation of this approach instead of generating the set MST – semantic equivalents of the interrogative sentence, it is advisable to operate with the elements of the source MST, organizing a search in all the sentences of the source separately. During checking the case (1) the process of browsing of the semantic analogues for the given element is proceeded after a non successful search of each of the elements ST from the set MST_q.

Use of the approach described is based on the assumption that, during the change in the MST, any of the elements of the ST to an equivalent one, source value included in the MST, does not change. Let us demonstrate this with an example.



Both first sentences have the same meaning, which is "**Он купил мяч**", such as ST^1_{12} is equivalent to ST^2_{23}, and ST^1_{23} is equivalent to ST^2_{12}. And if the question is**"Что купил он?"**, then both sentences will be suggestions for the solution, because ST^1_{12} and ST^1_{23} are ST^3_{23} и ST^3_{12} in the interrogative sentence. And in the second sentence ST^2_{12} and ST^2_{23} are equivalent to ST^3_{12} and ST^3_{23}.

References:

1. Большакова Е.И. О принципах построения компьютерного словаря общенаучной лексики //Труды Международного семинара Диалог ‘2002 по комп. лингвистике и интеллект. технологиям. М., 2002, Т. 1, с. 19-23.

2. Голубева А.И. Скрепы как особый вид связочных средств и их функционирование в научном тексте // Научная литература. Язык, стиль, жанры. М.: Наука, 1985. с.272-280.

3. Севбо И.П. Сквозной анализ как шаг к структурированию текста // НТИ. Сер. 2. 1989, № 2. с.2-9.

4. Bolshakova, E.I. Phraseological Database Extended by Educational Material for Learning Scientific Style. In: ACH/ALLC 2001: The 2001 Joint International Conference. New York University, New York, 2001, p. 147-149.

5. Kurohashi, S., Nagao M. Automatic Detection of Discourse Structure by Checking Surface Information in Sentences. In: COLING 94 Proceedings of the 15th Int. Conf. On Computational Linguistics. Vol. II, 1994, Kyoto, Japan, p. 1123-1127.

6. Ono, K., Sumita K, Miike S. Abstract Generation Based on Rhetorical Structure Extraction. In: COLING 94 Proceedings of the 15th Int. Conf. On Computational Linguistics. Vol. II, 1994, Kyoto, Japan, p. 344-348.

7. Анна Елашкина, Алексей Разумов, Александр Русин. Экспертная информационно-поисковая система, основанная на семантической сети. Труды международной научно-технической конференции "Информационные системы и технологии - 2000", НГТУ, Новосибирск, 2000г.

8. Дымарский М.Я., Максимова Н.В. Диалогический синтаксис: принцип "Не только: Но и" // Дискурс. - 1996. - № 1. - С. 88-102.

9. Елашкин В. Н. Концептуальное описание модели нейронной сети. – Труды ВЦ СО РАН. Информатика. - Новосибирск, 1994. - С. 122-137.

10. Нечипоренко А., Русин А. Система автоматизированного извлечения знаний из текстов на естественном языке. Труды международной научно-технической конференции "Информационные системы и технологии - 2003". НГТУ, Новосибирск, 2003г.

INFORMATION TECHNOLOGIES IN TEACHING CHEMISTRY

A. Khachatryan, E. Kazoyan
Yerevan State University
Yerevan, Armenia

The world is changing rapidly and natural sciences are also in the mainstream of these changes. Information-oriented societies are being formed everywhere.

Development of computer techniques itself and information technologies would be impossible without the newest achievements of chemistry, without generation and widespread production of new chemical materials, super-pure conducting and semi-conducting metals and alloys, high magnetizing and demagnetizing substances, special plastics and many other materials.

Information technologies, in their turn, encourage further development of chemistry and enhance the level of education, modeling and management of the production processes.

Development of information technologies poses new problems for education in universities and secondary education levels. The blackboard and chalk, even pretty colored slides, outstanding fantasy and eloquence of a teacher or a lecturer cannot ensure complete adoption by students and pupils and assist to the development of their logical thinking. Nowadays scholars wish to observe physical and chemical phenomena occurring with chemical substances in movement and evolution and to try to come to the very core of phenomena.

The important goal of education to date is the development of academic knowledge and thinking skills.

From this point of view there are unlimited opportunities such as different animation programs and electronic manuals already slowly but confidently penetrating into schools and being used during the lessons.

In order to produce electronic manuals the Open Society Institute Assistance Foundation and the Chair of Algorithmic Languages of the Yerevan State University generously contributed to achievements cooperating with experts of different fields of natural sciences as well as chemists, and produced a number of interesting electronic manuals, in particular – *The Virtual Chemical Laboratory*, *Chemistry – 7*, *Organic Chemistry – 9*, *General Chemistry – 10* etc.

Chemistry is a specific discipline because knowledge in chemistry cannot be completely utilized without laboratory experiments and problem solving. However, in fact not all the schools have the possibility to conduct laboratory trials and practical training according to the planned programme. That is the reason why it is impossible to overestimate the role and importance of the electronic manual *Virtual Chemical Laboratory*.

As the author of more than ten books I would like to especially emphasize that I took part in the creation of the electronic manual *General Chemistry – 10*. The young specialists of the sub-faculty of Algorithmic Languages – E. Petrosyan, N. Karapetyan, V. Yesayan etc – also greatly contributed to the creation of that manual.

The National Institute of Education of the Ministry of Education and Science of the Republic of Armenia was responsible for distribution of compact discs produced in the schools. The following table demonstrates the breakdown of the electronic manual *General Chemistry – 10* by regions of Armenia.

Yerevan	143	Kotayk	73
Aragatsotn	17	Shirak	70
Ararat	15	Syunik	25
Armavir	42	Vayots Dzor	24
Gegharqunik	61	Tavush	33
Lori	87	Total	590

Responses from the schools are quite positive.

At the same time I also teach in school (the A. Shirakatsi College) where I conduct part of lessons using this electronic manual. The pupils are extremely happy and deeply impressed with these lessons and demonstrate love and attachment towards chemistry.

Animations embedded inside of the manual give a broad opportunity for better understanding of some difficult topics such as:

1. diminution of electrical conductivity of metals as temperatures rise;
2. corrosion of metals;
3. burning of substances etc.

The electronic manual *General Chemistry – 10* provides also a wide opportunity to teachers to determine the level of acquired knowledge. The manual mentioned has a large bank of tests, which allow a teacher to get a set of a certain number of questions, and to estimate the knowledge of pupils, when they answer to the questions in a fixed period of time.

Wide application of information technologies may also have some negative influence along with the vast positive effect as far as computer technologies somehow individualize the teaching process. So if it isn't combined with the new cooperative and interactive methods of teaching, unfortunately there might be set up conditions for estrangement and formation of an egoistic society as a result.

Domestic and foreign electronic manuals, animation training programs, graphical demonstrative materials for physical and chemical phenomena and various calculative mathematical programs produced with the help of information technologies are also employed at the Faculty of Physical Chemistry of Yerevan State University for training of both bachelors and undergraduates. For example, the training animation programs *Pchem*, *Protein*, *Hemod*, *Membrane*, programs of mathematical processing of theoretical and experimental data *Origin-7.5*, *Hyper-6*, *Mathcad* etc.

Wide application of information technologies both in school and university education systems of course will promote a better adoption of training material and serve as a great incentive for development of natural sciences.

NEW TECHNOLOGY IN SECONDARY SCHOOL (FROM THE EXPERIENCE OF THE SECONDARY SCHOOL N69 AFTER A. SAKHAROV)

Karine Samvelyan
Secondary school N69 after A. Sakharov,
Yerevan, Armenia

The globalization processes, the growth of information, the integration of human activities in different fields are the new challenges for the secondary schools.

The teaching process, the process of gaining skills and habits, civic education, work with students must be led to mental development and strengthening of the motivation, stirring up independence activities. Such approach suggests educational reforms that must be revealed not only by changing of school curriculums and textbooks but also by changing the educational process itself.

Educational reforms in Armenia are bright examples to this. We can see the process of gradual transition to student centered system, changing to the interactive methods of teaching introducing computer based technologies during learning process.

Stirring of students' activities take place, children actively, take part in getting new knowledge, skills and habits. Methods of interactive teaching, the growth of students' activities propose the presence of definite resources both for children themselves and teachers.

One of the most important reform aspects is the fact that standards have been worked out to knowledge skills and habit demands in different subjects. In fact, you can find demands to skills and habits of students 'work with information in standards in all subjects: search, studying, working, application. That's way, Informatics as a school subject has been introduced in Armenian schools since grade 5.

I'd like exchange my experience in using new technology at our school. First, some information about our resources.

We have established a computer laboratory in our school since November, 2004. This lab is a part of Armenian School Connectivity Program (ASCP). This program started in November, 2002, and enabled to create the network of Armenian schools. The number of online schools is 330, including a mobile lab which is serving to 20 rural schools. Funded by the US State Department, Bureau of Educational and Cultural Affairs, ASCP had similar, fundamental components beyond hardware and Internet connection. These included extensive training of site staff at school-based Internet Computer Centers and free training for all students and teachers of the host school, as well as neighboring schools. Project Harmony provided seminars, conferences, and trainings for school representatives and community members on the integration of technology into education, the sustainability of centers, and the creation of Armenian-language resources, such as websites linked to the Republic of Armenia schools curriculum on different subjects and others. In addition to ongoing virtual exchange opportunities, the program incorporated physical exchange components with strong follow on activities that provide forums for professional exchange among Armenian and American educators.

Project Harmony continues to strive towards ensuring diversity within the Armenia School Connectivity Program. Fifteen special schools (for the pupils with special needs) are currently involved in the ASCP network, and students and teachers from these schools participate in various online and offline projects. Project Harmony targets ethnic minority communities also. Currently, Project Harmony is in the process of transferring the ASCP network under management of the Government of Armenia (GoA) as a national project. To date, this is the only large-scale project accepted by the GoA for co-financing, as Information Technologies are considered to be a top priority in the general development of Armenia.

Our school have got 6 computers, scanner, printer, digital projector; Internet connection also is provided. There are about 1000 students in our school and they are using computers in educational process.

Below are some examples to explain how the information technologies and resources are used in our school.

1. To teach Informatics, Physics, Chemistry, Math, Armenian History, World Geography, World History, Armenian, English and Russian languages with using educational CD's, Power Point Presentations (PPP) prepared by students and teachers..
2. To use the resources in group works with using project methods in different subjects, for example PPP about A. Sakharov, PPP about South American Countries etc.
3. To use the resources by teachers in their professional needs and taking participation in the different competitions.
4. To use the resources in creating e-library.
5. To use the resources for creating school's e-portfolio.
6. To use the resources in school administration.

THE EFFICIENCY EVALUATION METHODS OF DISTANT LEARNING SYSTEMS

Tigran Aynajyan
State Engineering University of Armenia
Yerevan, Armenia

The development of IP technologies and high speed data networks helped to establish a new generation of network services and systems; multimedia and hypermedia, IP-television, telemedicine, distant (computing) learning systems (DLS), 'virtual laboratories', etc.

These systems need a better capacity and quality of service (QoS), than the network applications of first generation.

For most of them, high quality of service is a strong technological requirement, assuring the average performance and success in the market of network services. For example, for DLS, the QoS level must correspond to the requirements; network infrastructure standards; utilized educational technologies and standards, economical expediency, economical limits applied to the methods and means of organization of DLS interaction; integrity, accessibility and continuity of the whole educational process organization.

The DLS is the integrity of data transaction means, information resources, interaction protocols, development packages and organizational-methodical maintenance, oriented on the fulfillment of educational needs of the users.

The DLS consists of: individuals, directly or indirectly engaged in the educational process; content which determines the material base of interaction; resources, assuring the DLS interface and implementing functions of monitoring, control and educational process adaptation.

The DLS is characterized by a duality of behavior. On the one hand,

a) by the principals of resources distribution, general accessibility, methods of access organization and data transaction as other network services and systems;

b) by the principals of user interactions - real time man-machine systems; and

c) by educational process management methods, like the workflow automation systems.

On the other hand it is different

a) from network services and systems by its level of integration of different data streams (audio and
video, multimedia and hypermedia, graphics, analog and digital, etc.) and service types (e-mail, forums, audio and video conference systems, file transaction systems, electronic library with online catalogue, search and retrieval system, «virtual laboratories», electronic storages and databases, systems of distributed calculations and experiments, etc.) within a uniform system;

b) from real time systems because of the hard ergonomic requirements and principals of adaptive man-machine interface creation; and

c) from workflow automation by technological and organizational specificities, resources and methods of educational process implementation.

The DLS are considered to be complicated program-technical systems, which integrate various network and educational technologies into a uniform educational complex. The effectiveness of DLS and the quality of educational process organization largely depends on the methods of their projection, system resource management, monitoring and evaluation of characteristics.

Inadequate consideration is given not only to the questions of DLS projection as to a specific integrated system, but also to the means of monitoring and estimation of effectiveness. Authors do not have significant results of DLS traffic measurement and analysis, of the study of the influence of different methods of data processing and transmission on the quality of trainees' query service, according to the estimation QoS level depending on the number of trainees, utilized methods and technologies of the organization of education.

Therefore the designing of DLS projection methodical bases, mathematical models, analysis methods, and estimation and optimization of QoS characteristics is an important practical and theoretical task.

The proposed work is dedicated to the research of one of the most perspective trends of the organization of information transmission to DLS – the data multiaddress transmission method. The application of the method allows the considerable reduction of the time of DLS to reply to the listeners' queries and enhances the efficiency of data transmission channels use and the QoS of DLS as a whole. Research into such systems has begun recently. The complexity of the analysis of such systems is mainly conditioned by the net traffic character. As it has been indicated by a number of measurements the traffic in IP network is of a pulsing, self-similar type for a wide range of net services and systems. The character of such traffic noticeably complicates the mathematical models and DLS characteristics estimation methods.

In the present work a complex of mathematical models and analysis programs for estimating the characteristics of DLS with multiaddress transmission of packages is proposed, which takes into account: the properties of real network traffic, the technological and ergonomical limitations upon the system parameters, the algorithms of resource sharing, and the methods of management of system users' queries servicing.

MEANS OF KNOWLEDGE CONTROL IN THE SYSTEM OF ADAPTIVE COMPUTER EDUCATION

N.N. Khublaryan, A. E. Oganesyan
Russian-Armenian (Slavonic) University
Yerevan, Armenia

We live in an era when one of the most conservative spheres of the human socio-cultural activity, the education system, including all its stages (secondary, vocational, higher), is undergoing fundamental changes. The contradiction between rapid growth of Knowledge, new processing technologies, storage capacities and transfer rates of information and the traditional paradigm of education demands urgent solution by installation of new educational technologies, approaches and pedagogic innovations. Implementation of the information, telecommunication and computer based technologies in the system of education is seen as one of the most effective ways of problem-solving in the modern school. It provides new opportunities in education technologies leading to formation of the new information-educational environment.

The new paradigm can be described as one having improved quality of education and intensified the process of education by integrating all components of the education system (e.g. education of schoolchildren, control and test of knowledge, organization of the teaching process) and directing them towards solution of tasks facing the modern school.

Effective means include modern computer, network and information technologies, which can be used either as a supplement to traditional education enriching it with visual methods, flexibility and self-descriptiveness or as an independent mode of education, which aims at differentiation of education and adaptation to the individual pupil or a group of pupils. Testing and control of pupils' knowledge is an important part of the new education system. Besides traditional tasks of testing, control and evaluation of knowledge, it also defines individual (personal, psycho-physiological, age, other) particular qualities of every pupil, the guidelines, methods and pace of education process, adapts the system to the needs of the concrete pupil, checks the level of residual knowledge, ascertains the possibility of his/her cooperation with other pupils (compatible with him), etc.

The current paper suggests means of testing and control of knowledge applied in the adaptive system of computer education. The scenario approach lies in the basis of the system. The teacher creates his/her own virtual course choosing successive steps of the subject, as well as testing and controlling knowledge, where means of testing depend on the official standards of evaluation of knowledge and skills in separate disciplines and serve as feedback for the system of adaptive education.

Check of knowledge by means of tests is carried out by the principle of hierarchy: it starts with the main concepts and categories and arrives at the applicable skills in solving test problems. By the request of the teacher or the pupil (if the system is functioning in the mode of self-control and self-training), the system generates the sequences (mutually correlated, if required) of test questions. It checks the accuracy of answers, offers recommendations and links to materials for re-training in case of a low mark or a wrong answer.

With the aim of adapting the system to the individual qualities, style and preferences of the pupil, as well as defining the pace of teaching and volume of the taught material, the system also collects statistical data about actions of the pupil including time and frequency of separate operations, sequence of right and wrong answers, frequency of use of reference materials, referring to prompts, etc.

The basis of the system, the statistical model of the pupil interface within the system allows measuring particular qualities of the pupil, including the level of his/her knowledge and the expected timeframe of his/her education, needed for the control of the education process.

The system of knowledge testing and adaptation was approved during the preparation of materials for Information Science for the secondary school sixth form pupils.